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ABSTRACT

This report documents a hearing to extend authorization of appropriations under the Vocational Education Act of 1963. The discussion focuses on the role of vocational education in economic revitalization and reindustrialization. Testimony includes prepared statements, letters, and supplemental materials from four individuals representing the Illinois State Chamber of Commerce, American Society for Training and Development, Ohio Department of Economic and Community Development, and Macomb Community College, Warren, Michigan. (YLB)

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HEARINGS ON REAUTHORIZATION OF THE VOCATIONAL EDUCATION ACT OF 1963

Part 12: Reindustrialization

HEARING
BEFORE THE
SUBCOMMITTEE ON ELEMENTARY, SECONDARY,
AND VOCATIONAL EDUCATION
OF THE
COMMITTEE ON EDUCATION AND LABOR
HOUSE OF REPRESENTATIVES
NINETY-SEVENTH CONGRESS
SECOND SESSION
ON
H.R. 66
TO EXTEND THE AUTHORIZATION OF APPROPRIATIONS
UNDER THE VOCATIONAL EDUCATIONAL ACT OF 1963

HEARING HELD IN WASHINGTON, D.C., ON
APRIL 29, 1982

Printed for the use of the Committee on Education and Labor



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HEARINGS ON REAUTHORIZATION OF THE VOCATIONAL EDUCATION ACT OF 1963

Part 12: Reindustrialization

THURSDAY, APRIL 29, 1982

HOUSE OF REPRESENTATIVES,
COMMITTEE ON EDUCATION AND LABOR,
SUBCOMMITTEE ON ELEMENTARY,
SECONDARY, AND VOCATIONAL EDUCATION,
Washington, D.C.

The subcommittee met, pursuant to notice, at 10 a.m., in room 2175, Rayburn House Office Building, Hon. Dale E. Kildee (acting chairman of the subcommittee) presiding.

Members present: Representatives Kildee, Miller, and Erdahl.

Staff present: John F. Jennings, majority counsel; Nancy L. Kober, majority legislative specialist; Richard DiEugenio, minority legislative associate.

Mr. KILDEE. The Subcommittee on Elementary, Secondary, and Vocational Education is continuing hearings today on the reauthorization of the Vocational Education Act. This morning's hearing will focus on the role of vocational education in economic revitalization and reindustrialization.

The need to reindustrialize this country and revitalize our economy stems from a number of problems. Many of our older industrialized areas have suffered the loss of jobs and plants. Workers have been displaced because of foreign competition and technological change. American productivity is lagging compared to some other countries.

The issue we will address today is how vocational education can help stimulate the productive capacity of the Nation. Many industries are experiencing shortages of skilled workers; yet, despite the spiraling unemployment rate, there are no workers to fill these skilled jobs. We are anxious to hear the witnesses' views on the role vocational education can play in economic development.

I am Dale Kildee, member of the subcommittee. The chairman is in a budget meeting. So, we will start with a consideration of the Vocational Education Act. Its importance is both national and local.

In my district, unemployment runs at 25.4 percent. I think that it would be helpful for this committee to see how vocational education can help us to remedy this situation, both for national purposes and to help end unemployment.

(1)

Today we will hear from David E. Baker, executive vice president of the Illinois State Chamber of Commerce; Michael Hobson, deputy director of the Ohio Department of Economic and Community Development; Edward J. Lynch, dean of occupational education at the Maconib Community College in Warren, Mich.; and Anthony Carnevale, an economist with the American Society for Training and Development.

Would they please come forward?

You may proceed in any manner that you have arrived at yourselves. Your written testimony will be included in its entirety in the record. If you wish to summarize or present it in some other fashion, you are welcome to do so.

**STATEMENT OF DAVID E. BAKER, EXECUTIVE VICE PRESIDENT,
ILLINOIS STATE CHAMBER OF COMMERCE, CHICAGO, ILL.**

Mr. BAKER. Thank you, Mr. Kildee. I am David Baker. I think we will proceed in the order in which we are listed.

I am executive vice president of the Illinois State Chamber of Commerce, which is the largest business organization in Illinois.

I come here, however, from my experience with the Illinois 2,000 program, a program run by the State chamber designed to set long-range economic goals for the State of Illinois in conjunction with working together with business, labor, government, and agriculture.

What I would like to do today is summarize my remarks, which focus in the following areas.

The first is what I call the Illinois economy and economy in transition, which reflects, I think, the same direction as the economies of Michigan, Ohio and other major economies of the Midwest.

The second would be to look at the role of high technology in revitalizing both our existing industry and providing new areas for growth and development in the Midwest.

The next area would be to look at the implications of this move toward high technology on training in the workplace and creation of what we call the workplace of the future.

Next, I would examine the implications for the vocational education and technical training field. I will reflect on a number of examples that we have in Illinois of the success of moving quickly to accept this new challenge.

Finally, I will suggest from my own personal perspective some opportunities for the Federal Government through the reauthorization of the Vocational Education Act to perhaps provide a Federal focus and catalyst to spirit this change even further than it has gone already.

Illinois is indeed an economy in transition. We learned from Illinois 2,000 four fundamental facts, which I think clearly describe the changes that we are undergoing in the Midwest.

Although we have a very strong and vibrant economy, and have had one, indeed, since our birth, we notice in the latter part of the 1970's four major trends:

First, our population growth is slowing. In fact, it was negative from 1970 to 1975.

Second, we have experienced extremely low growth in our per capita national income, in fact, among the lowest in the country.

While we are about \$1,000 per capita above the national average, we indeed are way behind in our growth rate.

Third, in 1978, Illinois' unemployment rate surpassed that of the national average for the first time in recent history.

And fourth, we have experienced significant structural changes in our economy, particularly with the decline in manufacturing and the increase in workers in the information and service sectors, very typical, I would say, of most Midwestern States.

Now, where does high technology come in in this area? I think it is a fundamental challenge to us in the business community in Illinois to make a positive investment in our aging plants and equipment and to assist in the training and retraining of workers to work with this revitalized industry.

A key purpose of this would be to counter worldwide competition for jobs in factories. This includes competition from our neighboring States and competition from other regions.

It is critical, however, that we in the private sector accept this responsibility and we hope to do this through taking advantage of the President's economic recovery program.

We have a two-phase strategy here. One is the application of high technology—I include all of microelectronics in this category—to our old industry, to our current firms. All of this has an opportunity and we are seeing this occur across the board in our State and in other States in the Midwest.

The second is to encourage the growth and development of new high technology firms right within our State. These are what we call growth sectors, and I think can supplant and enhance industrial growth in our State while we are revitalizing our current industrial base.

I think it is important too to acknowledge that we have to look at support of the growing information sector, banking financial community, and commercial sector which call upon this high technology just as much as our industrial base does.

Indeed, we are seeing in Illinois the movement of firms out of the Southwest and the West where the high technology industry was born into our area to provide both production and repair facilities to service our existing economy.

However, both of these strategies depend on a critical issue, which is training and retraining of people to work in the new factories, the redesigned factories and the new companies.

Now, it is not that easy to do because the training system that we have developed in this country has not been developed around high technology. It has been developed around basic industries, basic skills.

Yet, what we are seeing with the new microelectronic revolution, as I call it, is a total change in the way that we do business, both in the assembly line and in the office.

We are seeing microprocessors, televisions, lasers, and telecommunication systems actually replacing workers in terms of the hands-on operation in relationship to the production of equipment.

We are seeing the necessity now for people to expand their understanding of what goes on in the workplace such that they can

run the machines that do the work rather than doing the work themselves, and I think it presents quite a fundamental challenge for us in the vocational education and training community.

On one hand, we have a great opportunity to replace the multitude of mundane, dangerous, and repetitive jobs that we see both in the industrial and in the office workplace. On the other hand, we have a number of questions which we in America must answer in the next few years, I suggest, in terms of the psychological impact on workers; the fact that many workers, particularly those that have reached their 30's and 40's that do not have basic skills and the ability to comprehend what is going on, to be retrained.

Also, a tremendous challenge for the education system to train young people for much more creative jobs managing these systems rather than being a cog in a great industrial machine.

It is very important, I believe, that the vocational education community anticipate this revolution. I think we need to recognize that there is going to be a diverse impact and diverse changes.

We will need to become very flexible on a community-by-community basis in reacting to the different kinds of industries that are going to be born under this revolution.

The other thing is that firms today really do not know what the implications of this revolution are for their own work force and their own management skills and abilities. I do not think that even management knows what is going to happen when they introduce these new microelectronic computers.

The education system in the past has been quite rigid. It is going to need to be much more flexible in the future. We are going to have to essentially upgrade and retrain the entire American work force in the next 10 years as we introduce these new systems.

We are also going to, in the education field, have to become much more sensitive to technology forecasting to be able to anticipate the new state-of-the-art equipment to acquire it either by lease or perhaps by purchase, or just be loan from firms because technology is changing so quickly.

And finally, I think we are going to have to deal with this in the context of a value systems of the American worker that we still do not quite understand in terms of how those values have changed from the 1950's and 1960's into the 1970's.

Let me look very briefly at the situation in Illinois, what are we doing, what we have done in the past and how do I think we can get ready for this revolution.

Our department of adult vocational and technical education has full responsibility working with local communities for the evolution of our vocational education training program.

We reach about 1.9 million people a year in Illinois with various kinds of vocational programs. We spend about \$456 million, of which about 7.2 percent comes from the Federal Government overall.

One of the key programs that we have used since 1978 to respond to this new challenge is called high impact training services, or HITS for short.

The Illinois State Chamber of Commerce is proud of its role in supporting the State government's creation of this program in concert with local government and local chambers of commerce which

provides the opportunity for direct relationship on a rapid and specially one-by-one designed basis to provide industry with trainers and equipment to respond to specific retooling, retaining, or new training programs for existing and new industry.

It is very specialized and it is at remarkably low cost.

In fiscal 1981, we trained 1,135 people in this program with \$652 per person and a total budget of \$740,000 of which the Federal Government contributed about 30 percent.

Let me give you a few examples of what I am talking about. In Genoa, Ill., General Telephone & Electric, GTE, has been building electromechanical devices for telephone communications since 1907.

You can imagine the changes that have occurred since that time. In the 1970's, they committed to stay in Genoa instead of moving somewhere else, and they have completely rebuilt that facility and have trained all of the people working in that facility through this HITS program.

They have been so satisfied with the relationship—they have moved from electromechanical to microcircuit production in that facility and turned it into a modern facility—they are so pleased with their relationship with State and the local training through Kishwaukee Community College that they are now building a laboratory and work stations in Kishwaukee to train their people off-site and then bring them in. And they are contributing the equipment to this process.

An example of a new company is Newtherm International in Mt. Vernon, Ill., which is about 40 miles south of Springfield. They build nuclear powerplant heating devices. It is a small company of about 40 employees.

Thirty of those employees have been trained since 1980 in cooperation with the HITS program and they have been able to bring their program on line a year faster than expected.

The training facilities of Rend Lake Community College have enabled them to use local people to employ local people in a totally new and totally sophisticated operation to provide a unique service to the nuclear power industry.

In a fascinating new program that is occurring now in Parkland Community College located in Champaign, Ill., local high-tech firms that settled there because of the proximity to the University of Illinois have asked Parkland to put together a prototype lab for the production of prototype microcircuits that they use in their research and development base.

Until this project comes on line, they have to send to Chicago or elsewhere to get these done with a 6- to 8-week delay. But as a result of the creation of this lab, we are going to be able to upgrade the workers of these new high-tech firms. We are going to be able to provide the actual product through the community college lab.

We are going to be able to train new technical people, and we are going to provide a facility for production of this equipment for the University of Illinois.

Finally, we have another example of how our community colleges and technical training facilities can be used.

A group called Computer Visions, Inc., of Massachusetts has put a \$650,000 facility at no cost to the college in Elgin Community College.

The system is called CAD-CAM, computer assisted design-computer assisted manufacturing. This is the wave of the future for the way that all of our existing firms are going to be doing their basic design and drafting.

They are training and retraining people from all over the northern Illinois area plus training new students in how to use this equipment so they will be able to move quickly into industry.

And the company comes in and provides a service to Illinois firms on how to adapt their design and manufacturing processes to this new computer-assisted process.

I think it is an exciting opportunity and example of a very cost-efficient way of moving quickly into this computer generation.

Finally, let me just close with a couple of personal ideas of the way I think that this committee can suggest to the Congress and the administration the way the Federal Government can assist in the evolution of vocational education to meet this new challenge.

I think first of all, it is important for the Federal Government to continue funding vocational education, particularly in this catalytic role and with added flexibility in working with State and local governments so that they can move in with this direct economic development role even while they are supporting basic vocational education.

I think the Federal Government could assist in developing technology forecasting prototypes so that local agencies and State government can move ahead in figuring out exactly what is coming down the line.

I think there should be significant research, perhaps with existing funds or at existing levels, in terms of what kind of job changes can be expected from this revolution in the future.

I think it is very important for the Federal Government to assist in acting as a clearinghouse in trying to see all the different ways that local vocational education agencies and industry are cooperating on the exchange of new equipment, because it is changing so quickly, I do not believe that vocational education agencies can be expected to really purchase this equipment in the future. It just changes too rapidly.

And finally, I think it is important for the Federal Government to take the lead in the development of regional symposia across the country on the basic impacts of the restructuring of our workplace on those people that are in the lowest income levels and with the lowest skill levels in terms of how our education community can respond to training them to meet the new challenge of the much more sophisticated workplace that we are looking at in the 1980's and 1990's.

Thank you very much.

Mr. KILDEE. Thank you, Mr. Baker. Without objection, we will insert your prepared remarks into the record at this point.

[Prepared statement of David Baker follows:]

PREPARED STATEMENT OF DAVID E. BAKER, EXECUTIVE VICE PRESIDENT, ILLINOIS
STATE CHAMBER OF COMMERCE, CHICAGO, ILL.

Good Morning. My name is David Baker, and I am currently Executive Vice President of the Illinois State Chamber of Commerce, the state's largest business organization. We represent 6,000 members from all parts of the state and all sectors of commerce and industry. I also serve as Executive Director of the Illinois 2000 Goals Program. During its active stage from 1977 to 1980, Illinois 2000 worked with over 500 volunteers from all walks of life to set some 51 goals for Illinois' long range economic future. One of our top goals was to increase the private sector's role in job training (Illinois 2000 final report is attached).

I am most appreciative of the invitation of this subcommittee to address the twin issues of great concern to our state: Retooling of our industries to meet world wide competition posed by new, high technology, and training and retraining of our Illinois work force for this work place of the future. In my capacity as Executive Director of the Illinois 2000 program, I had the opportunity both to gain a perspective on the rapidly changing and evolving nature of our commercial and industrial base, and to meet and talk with individuals in our state's vocational education establishment who are working to respond to these changes.

In my testimony today, I would like to focus on the following elements surrounding these two issues:

1. The Illinois economy in transition;
2. The evolution of a high technology emphasis for existing and new industry;
3. Implications for training of the new high technology work place;
4. Current Illinois vocational education initiatives to respond to the above challenges;
5. The role for the federal government as a catalyst for experiment and change to support state and local initiatives.

I. ILLINOIS: A STATE ECONOMY IN TRANSITION

From the time of its entry into the union in 1819 until the 1970s the state of Illinois has experienced a rate of economic growth and prosperity rivaled by few other states. In 1973 we surpassed both California and New York in per capita personal income, ranking first among the six most populous states. Our traditional strengths of central location, energy, water, transportation, agriculture, industrial diversity, large labor force and strong communities have served us well in the post war era—until the recession of 1974-75, and the subsequent recession of 1980 which has continued unabated to this day in Illinois.

Illinois 2000 was created in 1977 by the Illinois State Chamber of Commerce on behalf of the business community. Its inception came in response to a number of troubling trends which were triggered in part by the 1975 recession, and in part by the increasing attractiveness to business of other regions of the country.

First, our population growth rate was negative from 1970 to 1975. For the decade of 1970-1980, total net growth was under \$300,000, or 2.8 percent of our 11.3 million population. Population forecasts for the 1980s place us among the slowest growing states in the Union.

Second, although \$1,000 above the national average of \$8,773 in 1979, Illinois per capita income rate was also among the slowest growing in the nation at the end of the decade.

Third, our unemployment rate, which had never exceeded the national average in the post war era, did so for the first time in 1978. Since then, we have had the dubious honor of fighting Michigan, Ohio and Pennsylvania for the highest unemployment rate in our nation; our current unemployment rate has now topped 10 percent.

Fourth, like many other states, we have experienced the transition from a manufacturing-based economy to a service based economy. We lost 224,000 manufacturing jobs from 1969, while manufacturing was dropping from 32 percent to 26 percent of the non-agricultural work force. Meanwhile, we gained 268,000 service/information jobs, while services moved from 15.3 percent to 18.5 percent of the non-agricultural work force.

Clearly, the transition in our economy as outlined by these stark statistics was not a positive one. Illinois, long used to a leadership position, was becoming a follower. We found that we were being out-hustled for jobs and new investments by our neighbors and other regions. The truth was that until the late seventies, Illinois did not really have to do anything about industrial/commercial development, it just happened.

Our Illinois 2000 analysis of these and other trends resulted in a set of positive goals and strategies for Illinois' economic future. Our clear challenge was to reverse this negative transition. Our most effective weapon: the enhancement of our state's basic strengths in the eighties, through investment in our plants, our cities, transportation systems, energy, and people.

II. HIGH TECHNOLOGY FOR EXISTING AND NEW INDUSTRY

Among these major goals, the greatest responsibility of the private sector in Illinois is to make the positive investment decisions to rehabilitate our aging industrial base and to retrain and refocus the energies of our large and generally skilled work force. One of the reasons for our state's sluggish economic performance in the last five years has been that the very pillars of our economy; steel, automobile construction, heavy equipment and consumer durables, have been hit hard by competition from abroad.

Our best chance to meet this competition in the eighties lies with our ability to adapt rapidly to the new technological and managerial opportunities presented by the advent of the microelectronic revolution. The emerging manufacturing improvements offered by microcomputers, lasers, robots and television are likely to be the primary source of the productivity jump that our basic manufacturing sector so sorely needs. Yet the critical factor will not be the acquisition of the hardware itself but the effective and positive molding of our current and future work force with the new technologies.

The complimentary strategy to the above is to build on Illinois' current high technology industry, large existing market and central location for full development of a high technology industrial sector. Both the State of Illinois' Department of Commerce and Community Affairs and the City of Chicago have initiated task forces, advertising programs and industrial development programs to attract high technology firms interested in manufacturing for and servicing Illinois' manufacturing and service firms. Already, Hewlett Packard, Apple Computer, Sperry Rand, and others have joined our existing giants of Motorola and Gould in the O'Hare corridor. In addition, State Highway 5 stretching west of Chicago through DuPage county has become another Massachusetts Highway 128 in terms of the siting of high technology and research firms.

These strategies will only be successful to the extent that well trained and re-trained workers are available for the multitude of skilled jobs required by these emerging industries.

III. IMPLICATIONS FOR TRAINING OF THE WORK PLACE OF THE FUTURE

From the previous discussion we can see that Illinois and the nation are betting on the prospect of the microelectronic revolution to aid us in reversing our productivity slump and in regaining the lead as world economic innovators. Our state expects not only to renew its basic industry but to become home for the expanding national and regional production facilities of the computer/electronics industries. But what are the implications of this revolution for the industrial work place, the management and the worker? I am afraid that few of us, industry included, have many answers as yet. I would now like to explore some of the more fundamental aspects of the change and the possible implications for vocational educational planning.

A. Components of the microelectronic revolution

Microelectronics, combined with other emerging technologies, permit machines to "think," "see," "hear," and "speak" in the undertaking of both word processing and manufacturing activities. Human beings have become more replaceable in the work place than ever before, starting with the many boring, repetitive, and menial tasks which provided steady work to the lesser skilled members of the work force. It is appropriate here to indicate briefly the nature of these technologies with "human" attributes:

1. Microprocessors are miniature computers capable of storage and retrieval of complex information, control of complicated tasks and communication of information. Their size has been steadily shrinking in recent years, while their storage and functional capacity has been growing exponentially.

2. Television, when its visual signal is reduced to digital codes based on differentiated shades of light and dark readable by computer, becomes the "eye" of the machine.

3. Human voice signals reproduced and now fabricated digitally will soon direct machines. We expect also to have word processors in the eighties which can deliver typed copy based on voice signals rather than keyboard entry.

4. Lasers permit extremely accurate measurement of manufacturing tolerances, thus improving on the human eye for precise tooling, welding, and quality control.

5. Telecommunications adaptation through electronic switching, message storage and retrieval, links among remote and central computers, electronic mail and so on, reduce dramatically the need for physical distribution and storage of paper and materials.

B. Implications for the work place

The potential implications for the work place are now emerging. Two years ago, Continental Illinois National Bank was one of the first Illinois firms to introduce electronic mail, teleconferencing and electronic management systems. While there was early resistance, on the part of both managers and support staff, this system is now pervasive in the bank and spreading quickly to other financial, service and manufacturing firms. People are starting to carry computer terminals home instead of a brief case.

Continental Bank and other firms now using these systems are experiencing increases in productivity. Certainly the producers, installers and servicers of the new equipment are benefitting. But the companies sense that major difficulties remain in assessing new human skills needed and the psychological problems associated with electronic isolation, information overload and fear of being replaced—by a machine.

In the industrial work place and the repair workshops of this country, computer-driven robots and replaceable electronic modules will supplant both assembly line workers and skilled craftsmen. Technological change has always been a companion of increased productivity and improved worker compensation.

But, as recognized in a 1979 publication by the AFL-CIO, Silicon, Satellites and Robots:

"While modern technological advances have contributed enormously to the enhancement of our lifestyles, they are also taking their toll at the work place. A new electronic device hailed as a time-saver by a plant manager may also result in massive unemployment. As machines become obsolete because of such advances, so do their operators. Highly specialized jobs for which they are not trained are are often created. Manpower requirements may be drastically reduced or perhaps eliminated entirely. The idea of working side-by-side with a robot is no longer merely science fiction. (p. 2)"

Thus, not only are the unskilled jobs affected by the new microelectronic systems, but skilled crafts, often first taught in our nation's vocational education institutions, are challenged. I suggest that we are also entering a time when the prestige position in the factory lies not with the industrial craftsman, but with the systems manager and equipment repairman.

In summary, the impact of the microelectronics revolution on the work place will be profound for the education system. While removing a wide range of mundane, repetitive, and skilled jobs from human attention, this revolution puts great pressure on the educational system to produce individuals capable of creative, responsible and adaptable work. The new office or industrial worker must be capable of synthesizing, managing and analyzing information at a time when public schools have great difficulty in teaching the basics.

C. Anticipating the microelectronics revolution: A new challenge for vocational education planning

The purpose for vocational education in our secondary schools and community college system is to provide students with the necessary skills and basic attitudes with which to secure and hold financially and emotionally rewarding employment. To this I would add a second purpose, now a focal point for Illinois' vocational education system, the contribution to the state's overall economic development through a partnership with business and labor.

If the work place of the future changes as rapidly and as profoundly as I have suggested above, vocational education will soon betray both purposes by educating students and retraining adults for jobs and working conditions which no longer exist. The following strategic issues outline the dimensions of this new challenge for local, state and federal vocational education planners:

1. Although one can make general statements about the the nature, scope and time frame for the microelectronics revolution, actual work place changes will be as different as the firms and communities in which they occur. This requires design of an anticipation, communication and curriculum development model which is adapt-

able by local vocational planners to the particular community and industry mix they serve.

2. Firms themselves may have little idea now of the implications of the microelectronics revolution. They may purchase the new hardware without calculating the full effect on worker skills, retraining requirements, and working relationships for existing and new employees.

3. The vocational education system as part of the overall education system is often resistant to change and tied to rigid curriculum, tenure, and instructional equipment purchasing requirements. Radical change will be extremely difficult to effect.

4. The vocational education planner is inevitably pulled between the strategies of upgrading in-house training in highly technical fields (requiring increased costs for equipment purchase) or focusing on education fundamentals supplemented with on-the-job training with local firms.

5. Technology forecasting, the process of anticipating the time frame for and the consequences of technological innovations, still lacks the sophistication of a highly developed discipline. Further, local education agencies and their industrial counterparts may be alienated by the potential costs, conjectural nature and long range scope of the technology forecasting process. Data collection will also be expensive and tied to willingness of high technology and local firms to share proprietary information about their equipment and long range plans.

6. As we enter this new era of change, we are still attempting to understand the implications of the values of life style revolutions of the 60s and 70s in work force attitudes. There are very few models in existence which document the impact of these even more recent changes on worker attitudes.

Having raised these basic issues, I would now like to turn to an examination of Illinois' vocational education community's response to the high technology challenge as it has emerged in our state.

IV. STATE AND LOCAL INITIATIVES IN ILLINOIS TO ADDRESS THE HIGH TECHNOLOGY CHALLENGE

In Illinois, overall state responsibility for vocational education rests with the Department of Adult, Vocational and Technical Education (D.A.V.T.E.), located within the State Board of Education. D.A.V.T.E.'s theme for its fiscal year 1981 annual report was "economic impact". Their program currently stresses economic independence, productivity and improved economic climate. In 1981, D.A.V.T.E. and local education agencies served 1,886,546 individuals at a total cost of \$455,807,935. Of this, \$32,685,396 or 7.2 percent from federal sources.

A. High impact training services (HITS)

Throughout the last decade my organization, the Illinois State Chamber of Commerce, has actively supported the state's vocational education initiatives.

In 1978 we joined with the Department, the State Board of Education, our State Department of Commerce and Community Affairs, local education agencies and community colleges in creating a new and exciting cooperative training program called High Impact Training Services, or HITS. This cooperative effort effectively cut through educational redtape to enable our existing vocational education system to respond directly and quickly to training and retraining needs of local firms.

HITS funds trainers and materials required to establish either in-factory or classroom training for new firms or firms undergoing expansion, production equipment changes or upgrading of employees. Agreements are executed quickly and the training carried out in close consultation with plant managers. In fiscal year 1981, HITS trained 1,135 people for new jobs, at a cost per individual of \$652.32. Based on an Illinois State Chamber analysis of what these new jobs mean for a community, the benefits of \$20,000,000 in new personal income, \$2.7 million in federal tax revenues and \$523,380 in state tax revenues far exceeded the \$740,385 in instructional costs. The federal government provided approximately 30 percent of HITS funding in fiscal year 1981.

As I learned in preparing for this testimony, the HITS program appears to be a nearly perfect model for responding to the issues outlined in the previous section. Already many existing and new firms, either introducing microelectronic systems into the work place or entering the high technology field, have called on the HITS program to upgrade existing workers or train new workers.

1. Retooling an Existing Facility:

In Genoa, Illinois, a small community 50 miles west of Chicago, GTE-Automatic Electric has been rehabilitating one of its obsolete facilities, constructed in 1907 to manufacture mechanical and electromechanical communications devices. Their goal is to convert the shell of the old facility into a modern, high technology facility for

the production of microcircuits, using all the most sophisticated equipment and a local work force.

According to John Lentz, Manager of Human Resources of GTE's Genoa facility, training was the key to a profitable retooling of the obsolete operation. "We just did not have the assets or the skilled individuals on our staff to initiate the training of an entire work force. Yet at nearby Kishwaukee Community College the curriculum development skills, the instructional aids, and the people were already in place," he said. Using the HITS program, Kishwaukee took GTE's task needs assessment and constructed an in-facility training program for the high technology equipment. GTE was so pleased with the results that they are now financing establishment of a classroom instructional program at Kishwaukee for further training of their workers. Lentz indicated that the high quality training, cooperative spirit and quick turnaround saved GTE thousands of dollars. He is committed to building a continuing relationship with the vocational centers serving his plant, and serve on their advisory boards to alert them of new industry needs.

2. Aiding a New High Technology Small Business:

HITS also has been effective in aiding new, small high technology firms to get started. In 1980, a new company called Newtherm International, Inc. was formed in Mt. Vernon, Illinois, in the southern part of the state. It produces a unique product, heating devices for nuclear power plants. Needless to say, the devices, although essentially constructed from sheet metal, had to meet the extremely high standards of the nuclear engineering industry. John Hanner, one of the owners and Quality Assurance Manager, said that the HITS program directly aided his firm in opening their production facility a year ahead of schedule. Further, as a key to their profitability, the firm had to depend on local workers. Since 1980, HITS has enabled Rend Lake College instructors to assist Newtherm in training 30 of its 40 employees in the utilization of computerized equipment required to construct the highly specialized equipment. According to Hanner, without the cooperative training effort of the state and local educational and business community, his firm probably would not have been able to afford to launch their company in Mt. Vernon in the first place.

3. Linking Vocational Education to Production of Prototype Equipment:

In Champaign, Illinois, this cooperative spirit among vocational and technical education, represented in this case by Parkland College, the University of Illinois, and small high technology firms is providing another excellent model for aggressive response to the high technology challenge.

Arthur Carroll is president of one of the local high technology firms now springing up around Champaign as a result of the University's excellent research and engineering programs. He was asked in February, 1982, by Dean Clifford Matz of Parkland College "What's the one thing that we could do to help you the most?" Carroll's response was to build and staff a laboratory for the production of prototype printed circuit boards so crucial to the firms research and development efforts. Currently the nine or ten small high technology firms must wait six to eight weeks for development of the circuit boards elsewhere.

As a result of this conservation, by early 1983 a combination of HITS funding, university research and staff advice, contributions of equipment by the local firms and construction of a facility by Parkland College will result in a functioning prototype laboratory. Through it and the new instructional and training program the community college will:

- a. Train and upgrade workers and repairers in the small, new firms;
- b. Train photography, art and electronics students to make the circuit boards;
- c. Produce the prototype boards at cost for the local firms to increase their competitiveness;
- d. Train 35 graduates per year, all of whom will be absorbed into the burgeoning local high technology industry;
- e. Provide a production facility for the microcircuit research projects of the university.

4. Education/business Cooperation for Provision of High Technology Training Equipment.

In addition to the cooperation spawned by utilization of the HITS program, our vocational and technical institutions are also becoming focal points for cost-efficient training of both professionals and workers on state-of-the-art computer equipment. Elgin Community College, northwest of Chicago about 40 miles, has become one of five sites in the country to receive at no cost a \$650,000 Computer Assisted Design-Computer Assisted Manufacturing (CAD-CAM) system from Computer-Vision, Inc. of Bedford, Massachusetts. The Computer Assisted Design component is now installed. A wide variety of instructional programs, both for technical students of the college and for production and design managers, draftsmen, and designers from all

over Northern Illinois are now underway. In keeping with the need for flexibility in scheduling training courses, the college is planning one day workshops, weekend sessions as well as longer academic courses.

Firms will be able, after completion of the workshops and courses, to begin to develop plans for installation of their own computer assisted design systems, and learn how to integrate this revolutionary tool into their design and production programs. Obviously, Computer Vision will benefit from this grant to the extent that they are able to sell systems in the Chicago Area. We welcome their consideration of locating a production facility here.

5. Increasing Computer Literacy:

Finally, the Department of Adult, Vocational and Technical Education is beginning its own process of sensitizing Illinois vocational education teachers to the microelectronics age. This year 18 microcomputer seminars are being conducted at community colleges, area vocational centers and high schools across the state. The purpose is to increase the computer literacy of the facilities and to encourage the curriculum changes necessitated by these new devices. In addition, local schools and D.A.V.T.E. are examining new curricula in microelectronics, robotics and other high technology fields. To support the new programs some area vocational centers have contacted and contracted with computer and communications firms to supply them on a revolving loan basis with the most up-to-date equipment.

V. THE FEDERAL GOVERNMENT AS A CATALYST FOR EXPERIMENT AND CHANGE

A. Summarizing the high technology challenge

As your committee considers the reauthorization of the Vocational Education Act, I believe it extremely important for Congress to assess the ways in which the federal government can assist with the education and training of people for tomorrow's, rather than yesterday's jobs.

Let me summarize briefly the major points I have attempted to make concerning the new challenge before the vocational education community, then suggest some possible directions for federal catalytic action in support of state and local training initiatives.

1. The Illinois economy is in transition as that of most of the states of the industrial North. If the transition is to be a stronger, more diversified economy, we must meet world wide competition for basic industry growth directly through increased productivity. It is likely that microelectronics accompanied by better management and improved training and retraining will be the key.

2. Industry relies now on the vocational education and technical training community for the expertise in preparing people for work and new jobs. This existing asset is highly prized by our Illinois firms. Business, particularly smaller sized business, does not want to invent, nor are they capable of developing a parallel in-house training capacity.

3. Right now, neither industry nor the education community can fully grasp the implications for the work place of the microelectronics revolution. We must have more research on this—and quickly.

4. The rapid change associated with high technology is costly for vocational education agencies who must invest in the expensive, ever changing hardware. We need new ways now for a cost-effective acquisition and/or access program for state-of-the-art technical equipment.

5. Finally, many lower skilled jobs, often taught in vocational education programs, are now being phased out of office and industry. Curriculum and teaching must focus on equipping all students to apply their abilities to more challenging opportunities or face permanent displacement in the work force.

B. The Federal role

1. First, a continued federal financial participation in state and local vocational education programs will prove in the future a wise investment in America's economic prosperity. From our Illinois experience, particular through the success to the HITS program, we are learning how utilization of the public asset of our education system can be responsive in a direct way to the revitalization and retooling of our aging industrial base. We also are creating local jobs for local people, thus aiding in the stabilization and growth of communities hard hit by the recessions of 1975 and 1980-82.

In this area, I suggest, maximum local flexibility (as with HITS) to permit new state and local experiments combining economic development with vocational education.

2. The Federal government, in cooperation with industry can play an important role in initiating technology forecasts of new production and office equipment. It also might develop prototype forecasting techniques for use by local agencies. Because of the great diversity of communities and local industry these techniques must be ultimately utilized by local planners. At first, however, federally supported programs could aid in reducing some of the mystery associated with technology forecasting.

3. I propose the channeling of existing vocational education research funds into a national analysis of the work place of the future. this research should examine "generic" job changes that can be expected, along with potential attitude and psychological problems which must be addressed by vocational education instructors in preparing our future work force.

4. I suggest a compilation and dissemination of innovative and cost effective local, state and joint public/private approaches to acquisition or access to the most up-to-date equipment used to train people for the new office/industrial work place. As we saw in our Illinois experience, many firms are quite willing to donate or lease equipment when they realize that their own people cannot operate or repair it.

5. Finally, I suggest the joint federal, business, labor and education agency funding or national symposia on the implications of restructuring and upgrading industrial/office tasks on those least capable of making the adjustment. My sense is that while we recognize a growing problem—in that computers and related electronics systems are already replacing key punch operators, file clerks, assemblers, draftsmen, and others, little clear thinking is emerging on a local and national level in response to these workers' plight.

A positive dream of a world in which machines accomplish the boring, dangerous, and non-rewarding jobs in life, must be accompanied by enhancement of educational and industrial training systems which equip people for yet-to-be developed, rewarding employment of the future.

Thank you.

Mr. KILDEE. Mr. Hobson?

STATEMENT OF MICHAEL HOBSON, DEPUTY DIRECTOR, OHIO DEPARTMENT OF ECONOMIC AND COMMUNITY DEVELOPMENT, COLUMBUS, OHIO

Mr. HOBSON. Mr. Kildee, I am Michael Hobson, deputy director of the State economic and community development department.

In my opinion, the industrial strength of our State can be retained only if we assist business not with just physical equipment, but with human resource training.

Several years ago, those of us who have been involved in the field of industrial development at a State level did not have to deal with the issue of job training.

Today, it is an integral part of everything we do in industrial training and for several reasons.

In the State of Ohio, we have put together a cooperative program with the division of vocational education and the State development department to design specific training programs for specific industries to meet two objectives.

One of our objectives, of course, is the need for specialized training in the creation of jobs and the expansion of jobs.

However, recently we are running across another issue, particularly in a State like Ohio that is hard hit with the layoffs in the auto industry and the auto parts industry, with an unemployment rate that is near the top in the Nation.

There is a need to be concerned with the issue of productivity of the work force and providing the kind of trained work force that meets the needs of today's society.

This particular program started out of necessity, and I think for the first time, at least in Ohio, the legislature and the State gov-

ernment have put on a unified effort, realizing that this is a need for the future.

In fact, the Ohio Legislature passed funds for the first time for job training, a cooperative program between vocational education and the State development department jointly to administer for specific programs dealing with those two issues of new and expanded jobs as well as retraining for productivity.

To give you an issue, there to date have been some 100 companies in Ohio participating in this program. It has cost the division of vocational education and the State development department approximately \$5 million this year just to meet those specific training needs of business and industry, with the most significant amount falling in the area of retraining skills for the more mature industries in the State.

To give you an illustration, if I could, one of the major programs was with General Motors in Dayton, Ohio, when Frigidaire decided to close that facility several years ago.

One of the agreements that the State made to keep General Motors in the area was that we would undertake a massive retraining effort of the Frigidaire employees who made appliances to produce engines and trucks with the most latest productive techniques.

Those were, in many cases, new jobs.

An illustration of another one is with the Grumman Flexible Co., who makes buses. There were no new jobs in that particular situation. However, the economy of one entire county was at stake if we could not retain those people.

So, we instituted a massive retraining effort.

One of the difficulties we have had in Ohio is that the vocational education program has never had the kind of flexibility to deal with those specific needs. Henceforth, the State development effort has had to foot a major portion of the bill.

This year, we were able to convince the legislature of this need and to date, I think approximately 75 percent of our program has to do in the area of retraining just to keep industries at a level pace in Ohio.

So, if I could urge one thing today, I could urge you that the vocational programs of tomorrow must have the kind of flexibility to deal with industry's specific needs.

In Ohio, they are unable to buy the kinds of equipment that it takes for today's industries to be productive, very sophisticated and expensive equipment. And we have only even scratched the surface of the particular needs in Ohio.

What we have done is buy equipment like computer numerical control, for example, to ship it around to the various school districts and industries to help meet the current needs of that particular skill level.

I have not even talked about the issue of some of the more sophisticated areas that we are trying to develop because costs are prohibitive.

We have found, however, that industry is more than willing to participate in training not only in the vocational education area instructors, but in giving up necessary equipment to help meet the kind of needs that they are seeing.

I suppose in summary, I think, if I could leave one message, that the training for improvement in productivity may be the surest way to keep industry from moving and from relocating or from being lost as a result of foreign competition.

We found in Ohio that many industries, excess capacity is an issue that we have to deal with. And again, I think the issue of flexibility is the key as far as the State development is concerned.

The development agencies are going to continue to maintain a significant role in job training, because we have found it an integral part of any inducement that we work with industry. That is all I have.

Mr. KILDEE. Thank you very much, Mr. Hobson. Without objection, we will insert your prepared remarks in the record at this point.

[Michael Hobson's prepared statement follows:]

PREPARED STATEMENT OF MICHAEL A. HOBSON, DEPUTY DIRECTOR, DEPARTMENT OF ECONOMIC AND COMMUNITY DEVELOPMENT, STATE OF OHIO

Mr. Perkins and Members of the Committee: I am Michael A. Hobson, Deputy Director of the Department of Economic and Community Development for the State of Ohio. The Development Department is responsible for directing all economic and community development in the state, which includes working with industries and businesses in Ohio for expansions of their facilities, attracting foreign and domestic industries who are expanding their operations to locate in Ohio, and keeping industries within our state healthy and profitable. The common goal behind these efforts is to provide Ohioans with as many jobs as possible.

My purpose in being here today, however, is to speak in support of legislation providing funding to Ohio for vocational education through amendments to the Vocational Education Amendments of 1976. The Department of Economic and Community Development and the Division of Vocational Education in the State Department of Education are presently cooperating in a very important business and industry training program within our state, and it is generally felt that this effort could have implications for vocational education nationwide.

The most recent figures indicate that Ohio is eighth in unemployment percentage in the nation. Ohio is a manufacturing state and the decrease in the automotive industry has had a drastic effect. Within Ohio, we are fighting the loss of our industries to the southern states, but more importantly, we are fighting the loss of our industries to foreign countries. It is my judgment that the industrial strength of our state and our country will be retained only if a concerted effort is made to assist industry not just with physical plant and equipment requirements, but with the improvement of human resources as well. I would remind the members of the committee that only manufacturing and agriculture are wealth producing industries and that wealth producing industries are the basis for obtaining funds for government, education, insurance, retailing, hospitals and related businesses. We cannot continue to export our manufacturing jobs to foreign nations and concurrently maintain a strong economy.

Our Department of Economic and Community Development has been successful in creating jobs for the people of the State of Ohio. Each 100 jobs in manufacturing provide for approximately another 68 job opportunities in the rest of the economy. Clearly, in Ohio the manufacturing industry provides the foundation for sound overall economy. As such, we will continue to make every effort to expand business and industry in our state in order to complement the other facets of our economy.

As I talk with industries about locating or expanding in our state, one of the first questions I am asked is about the availability of skilled manpower and training. I have learned that the availability of training is an integral part of an inducement agreement concerning new jobs. Industries are interested in the availability of training during a start-up phase and also as a means of providing a continuing supply of trained people.

Our vocational education program in the State of Ohio has done an excellent job of providing training for youth and adults on a continuing basis. During fiscal year 1981, 258,000 youth and 345,000 adults were provided training through our secondary educational facilities. In addition to the vocational training, our post high school technical institutions enrolled 91,000 students in associate degree programs. Both

the vocational and technical programs receive assistance from the federal vocational education funds made available under the Vocational Education Amendments of 1976.

In addition to the "supply" role identified above for vocational and technical education, a cooperative program has been developed between the Department of Economic and Community Development and the Division of Vocational Education to address two special needs concerning industry. One need is for a specialized training program for an industry creating jobs within our state and the other is for a specialized training program to deal with an industry that has serious productivity problems.

An example of an industry adding jobs through expansion is the renovation of appliance facilities in Moraine, Ohio, by the General Motors Corporation. The renovated facilities are now used as diesel engine and small truck assembly plants. Both of these products were new items to the General Motors Company. General Motors agreed to rehire 3,500 to 4,500 appliance workers and employ them at the assembly plants if Ohio would agree to help them with several areas critical to the new development, including training. Through the cooperation of federal funds from the Division of Vocational Education and funds obtained by the Department of Economic and Community Development, we were able to provide training to change the skills of the work force appliance manufacturing to engine and truck assembly.

The training services covered a number of different areas, such as worker orientation instructional material development, management training, on-site vocational instruction, off-site vocational instruction and specialized consultants. This effort prompted the president of the Chevrolet Division of General Motors to indicate the two new plants had the smoothest start-up ever experienced by General Motors at any site. Credit for the successful opening and current operation was given to the training program developed through the cooperation of the Department of Economic and Community Development and the Division of Vocational Education.

An example of the importance of training as a means of improving productivity exists in our efforts with the Grumman Flexible Company. The Grumman Flexible Company experienced significant production problems in the development of a new bus and it became important for the cooperative effort between our department and vocational education to provide assistance with training for the existing workers employed in the Grumman plant. While this effort does not provide new jobs, it provides a means of retaining jobs within our state and nation. Contacts received from international manufacturers in the state indicate a similar message; training for improvement of production may be the surest way to keep industry from moving overseas.

In spite of all the unemployment in our state and nation, we still find a shortage of workers in skilled occupation. The attachment to this testimony is from the Columbus Dispatch of the eleventh of April. The article indicates that this small employer was able to meet his needs only through the employment of a graduate from one of our vocational centers.

I believe that the training of skilled persons for new and expanding industries, and the training of persons to improve the productivity of existing industries, are in our national interest and as such the individual states should not be required to bear the burden alone. Such efforts should at least be on a matching basis and can be justified by the proven effect a skilled workforce has on the national and state economies.

I would encourage you to continue, and to improve, the vocational education legislation. This legislation assists vocational education in Ohio to train youth for entrance into employment and provides out-of-school youth and adults with both preparatory and upgrading training. In addition, I would encourage you to cooperate with economic development units in the various states in their efforts to both expand and retain the industry of this country.

[From the Columbus Dispatch, Apr. 11, 1982]

FELLOWSHIP OF WELFARE CRITICS GAINS A CONVERT

(By Leo Stratton)

Help wanted. Two machinists.

Charlie Hayes is the production manager at the Concrete Pipe Machinery Co.'s Columbus Division.

He's one of those guys who still believe that one of the most important things you can have is a job. People with "good jobs" are very lucky.

The company produces machines used to make concrete pipe. It is a small operation with three machinists. That is why Hayes was in a pinch when he learned several weeks ago that one machinist was changing jobs and another decided to retire.

Hayes had several "good jobs" to offer. An experienced machinist starts at \$7.18 an hour and could be earning up to \$8.47 an hour within 90 days.

More importantly, the work is steady—52 weeks a year with plenty of overtime pay.

"I couldn't afford to look and look and look," Hayes said. "I thought that with so many people out of work, I'd be able to get a good machinist right away."

Hayes called the Ohio Bureau of Employment Services' office in Whitehall. He had received help there before.

They sent him Dallas Kinnear. He had lots of machinist experience. But he was 63 and wanted to work two years with no overtime. Kinnear really thought he would rather go back to Cleveland.

Help wanted. Two machinists.

Next came Marcus Polhemus. He too had lots of experience—as a truck driver. Polhemus did have mechanical ability. He fixed his own trucks. But Hayes was looking for a machinist, not a mechanic.

A machinist reads blueprints and operates planers, shapers and lathes to produce machine parts that are within 10,000ths of an inch of being perfect.

Help wanted. Two machinists.

Roy Watkins applied. He had 11 years of experience as an engineer. A railroad engineer. The kind of engineer that drives trains. Sorry, Charlie.

Help wanted. Two machinists.

Next came Edward Silhavy of Waverly. He has 16 years experience as a bona fide machinist. At last. One down.

Help wanted. One machinist.

More good news. Another experienced machinist, Jim Chapman of 581 Harland Dr., applied. A past employer gave a good recommendation.

"You're hired," Hayes said with relief. "Be here at 6:40 a.m. We'll fill out the papers. We start work at 7 a.m."

Hayes said that the next morning his new machinist roared up to the office in his car at 7:08 a.m. He sauntered into the office with an orange drink in his hand.

According to Hayes, the conversation went like this:

"You're late," he told Chapman.

"You're lucky I came at all," came the reply.

"Take that drink back out to your car. We don't work like that around here."

"If I go out to my car, I'll keep on going."

"Don't let the door hit you in the back on your way out."

Chapman said he arrived at 6:50 a.m. But he confirmed the other details. He thought Hayes was being "picky" and had a bad attitude.

"I didn't want to work for a grouch," he said.

Wanted. One machinist who wants to work.

Hayes finally hired Ronnie Hall who is just out of the Scioto County Joint Vocational School in Lucasville, Ohio. Hayes says it will take about a year to make a top-notch machinist out of Hall.

Hayes has now joined the ranks of those who believe that unemployment and welfare benefits are incentives for people not to work.

He suspects that some of the unemployed apply for jobs for which they are unqualified. They meet the state's requirements to look for work, without taking the chance of finding a job.

Hayes has held the same job since 1941 even though the company has changed hands several times.

When unemployment is so high, he has a hard time understanding how anyone can have a bad attitude when offered a good job.

[From Dr. Jim Eaton]

THE AIRLINE WARS: A BLOOD FEUD

Braniff Airways is perilously close to bankruptcy—but would archrival American Airlines resort to dirty tricks and guerrilla warfare to force Braniff out of the skies? Last week the Civil Aeronautics Board begin investigating allegations that Ameri-

cans had tried to put Braniff out of business by hoarding and then dumping \$9 million worth of Braniff tickets for reimbursement at the Airlines Clearing House—a move that would create a critical cash squeeze at Braniff. The feud between the two Dallas-based airlines heated up when American's president, Robert Crandell, was widely quoted as having told a securities analysts' meeting in New York last week: "I don't want those people [Braniff] to stay in business." And there were rumors that American pilots were delaying Braniff planes by slowing down on airport taxiways, that its ticket agents were urging customers to switch from Braniff to American and that its executives were plotting revenge against the desperate airline for slashing ticket prices so low that American was losing \$12 million a month in the bitter fare war.

American has been a tough competitor. Since moving to Dallas in 1979, it has gone head to head with Braniff on many domestic routes. American has also bought some planes from Braniff and may want more.

But Crandell denies that American was trying to sabotage Braniff by dumping tickets or other dirty tricks. "That's a lie," he angrily told a Dallas newspaper. Preliminary inquiries by the CAB, the Federal Aviation Administration and the Airlines Clearing House turned up no evidence to support the allegations. Even without American's help, Braniff seemed to be digging its own grave by keeping fares at suicidally low levels while starving for cash. Ironically, the chairmen of American and Braniff are brothers, but that only seems to have turned the war between the two airlines into a blood feud.

[From Newsweek, Mar. 22, 1982]

TRAINING FOR THE FUTURE

(By Lester C. Thurow)

Nobody can build a high-quality economy with low-quality components. Yet this is precisely what we Americans are trying to do when it comes to the most important component in any economy—the quality of the work force.

Until 1981 the average test score on the Scholastic Aptitude Test—the test given to college-bound high-school seniors—had fallen for eighteen consecutive years. In 1981 the test scores did not go up, but at least they did not go down. No one knows whether the bottom has been reached or whether 1981 was merely a temporary pause on the route to illiteracy.

Math and science education is dissolving as math and science teachers abandon our school systems in droves for better-paying industrial jobs. Many high schools now have no qualified math teachers on their staffs. Given this situation, is it any surprise that Japan now produces more than twice as many engineers per capita, and that as a consequence Japanese products are better engineered than American products?

Robots: Except in recessions, the economy is short of skilled blue-collar workers such as machinists or tool-and-die makers. With a major military buildup under way, the shortages will increase from being acute to being critical. Regardless of how much we are willing to save and invest, without more skilled blue-collar workers the robots of the future won't be built or used.

Functional illiteracy seems to be increasing among both those who drop out of school and those who finish. Last year in New York City one out of every two people who took the examination to see whether they were fit to be telephone operators flunked.

Yet the Reagan Administration is dismantling the education and training programs of the Federal government. Many of them were severely slashed in last year's budget and again in this year's budget. And all of this is compounded by additional cuts at the state and local levels.

The economy is not going to thrive unless there is a major effort to upgrade the American labor force from the top to the bottom. After the sputnik shock, a rather minor but spectacular scientific defeat, the United States embarked on a highly successful program to upgrade human skills. Programs such as the National Defense Education Act led to improvements in science education, language skills and basic literacy.

Unfortunately, the United States reached the moon first and most of the education and training programs were abandoned in the aftermath of what was also a rather minor, if spectacular, scientific victory. In the 1980s a much less dramatic

but much more important economic defeat will require a similar, but this time sustained, effort to upgrade the quality of the work force.

Any specific training program can be labeled a failure, but the idea of training cannot be abandoned. Every failure simply has to be replaced with another attempt. One can be hard-nosed about illiteracy but the hard-nosed fact is that the functionally illiterate are going to be part of our society for the rest of their lives. And their children may carry on where they leave off. Without enough engineers and strong science education in our school systems, none of us is going to have a successful economy in the high-technology era ahead of us.

Social-welfare programs are essentially a matter of ethics and generosity, but education and training are not. I am willing to pay for the education of my neighbor's children not because I am generous, but because I cannot afford to live with them uneducated.

Bail Out: Because of demography, education is a declining industry. Unfortunately, declining industries are almost always dying industries. With declining enrollment there are few new job opportunities and little influx of new talent. As opportunities for advancement and promotion disappear, the people with external job opportunities, often the best people, bail out first.

Intellectual rigor is replaced with intellectual, sociological and administrative rigor mortis. Almost no one manages a dying industry well, and education is no exception. Educational bureaucracies become worse, not better, in their death throes. Yet no country can afford to let its education and training systems die.

It is strange that an Administration pledged to supply-side economics seems to think that the human component is unimportant when it comes to economic success. But whatever the cause of this psychological quirk, it is not a quirk with which the country can afford to live.

Mr. KILDEE. Mr. Edward Lynch?

STATEMENT OF EDWARD J. LYNCH, DEAN, OCCUPATIONAL EDUCATION, MACOMB COMMUNITY COLLEGE, SOUTH CAMPUS, WARREN, MICH.

Mr. LYNCH. Mr. Kildee, Mr. Miller, I am Edward Lynch, dean of occupational education at Macomb Community College.

I am appreciative of the opportunity to be here today. I want to somehow narrow the focus to a more local area. I will identify the occupational changes that are occurring within our service area. I will identify how our college is responding, and then I have some specific recommendations in terms of the proposed legislation or changes to it.

On a personal level, I would like to say, Mr. Kildee, thank you for your involvement in Macomb Community College. I am sure exactly where I would be this morning if you had not been helpful.

Macomb Community College is a comprehensive multicampus 2-year public institution located in Macomb County.

It has an enrollment of over 30,000 students. It is the largest of the 29 community colleges in the State of Michigan.

Macomb County is a highly industrialized county; 38 percent of our employment is in the manufacturing area.

The three large automobile companies all have major installations, General Motors, Ford, and Chrysler. Together, they employ about 40,000 individuals and that is down from a high of about 45,000, 2 years ago.

Macomb County is one of the three counties surrounding the metropolitan Detroit area. We are a county of about 481 square miles.

Of these three counties, Macomb is the one most closely tied to the automobile industry and as a result, currently has the highest

unemployment rate. In February of 1982, the unemployment rate for Macomb County stood at 18.3 percent.

Continuing a trend that began a number of years ago, more students now enroll in our 87 occupational programs than in the liberal arts transfer curriculum.

Macomb Community College as to the other community colleges in Michigan has a marketplace orientation. We have a long tradition of serving the needs of business, health, and the industrial communities.

Increasingly they are turning to us for instructional services. Macomb now serves an employer base of over 600. That includes providing related instruction in 40 different trade areas for 1,600 apprentices, which, incidentally, is down from a high of about 2,000, 2 years ago.

Displaced employers are also turning to us for retraining. We enrolled over 1,200 students last year sponsored by the TRA Act.

We regularly provide CETA training in the health and technology areas.

Education in Macomb County, as education across the country, has evolved into a life-long experience. We at Macomb have recognized the change. We have maintained a close working relationship with the community through a variety of structured interactions including apprentice programs, cooperative internships, advisory committees, a very large adjunct faculty drawn from local businesses and industrial concerns, and a standing offer to tailor and structure services to meet specific employer needs.

Much of Macomb County's industry is related to the manufacturing of transportation equipment. Another leading industrial component of our service area is that segment that provides the design in tooling of machinery and equipment from which other manufacturers can produce goods.

Without our service area, there have been a number of very significant job changes. I would like to highlight some of those.

Machinists have always been in high demand. Today, however, the need is for computer-trained machinists, individuals trained in numerical control technology.

The expanding use of robots within the automobiles industry requires advanced training for a wide array of skilled tradesmen.

The increased use of plastics and electronic components in the manufacture of automobiles is another change, as well the increased interest in solar and other alternate energy sources; the use of electronic components in an ever-increasing array of applications; the introduction of interactive computer graphics into the design field;

The crossover of construction-trained plumbers, pipers, journeymen into the industrial field; the first movements away from the single skill area journeymen; the recently renegotiated contract in automobile companies which establishes a special training and upgrading funds.

We find a greater emphasis on health and safety instruction within the workplace. We are being asked for increasing trained technicians working with environmental science and environmental concerns. There is the beginning of a movement to expand the community college's role in the training of apprentices.

We are being asked to provide hands-on or laboratory training where formerly we provided the related instruction, and then last, but not least, there is the down-sizing of the automobile.

To accommodate these and other changes in our service area, Macomb Community College has a plan of action. This plan has three parts.

It includes modifying and adding new areas of study. It includes making a significant investment in new equipment and remodeling of the physical plant. And we have made other major changes within our operating procedures and administrative organization.

We initiated the first steps to obtain State approval for 15 new programs over the next 3 years. This is in addition to new programs, about 10, within the last 2 years, and in the current year we have been required to modify 16 others.

Some of the more major programing changes include the introduction of a robotics program. In that program alone, we have invested over \$350,000. It is anticipated that we will need to double that amount again to bring that program up to any speed level.

The use of the computer in the design field required a total re-packaging of each of our program design areas. We have invested about \$400,000 in equipment. We anticipate having to run that lab 7 days a week, 24 hours a day.

The introduction of courses in nondestructive technology were required to accommodate the increased demand for product safety and reliability.

We have introduced more and highly sophisticated electronic equipment and instruction into our electronics program.

The demand for computer-trained machinists have required both the metal machining and numerical control programs to be modified.

We have introduced a new program in solar and alternate energy technology. The increased emphasis on quality assurance in manufacturing requires the purchase of laser equipment and the introduction of that into our metrology program.

There has been a consideration expansion of equipment and staff in data processing and computer programing along with a significant investment in our own instructional computer and peripheral equipment.

There has been the development of a program in word processing and a significant investment in equipment and remodeling.

We have designed a series of courses in the plastics technology.

All of these have been accomplished within the last 12 months.

In addition to changes in the vocational technical programs, we have made other significant adjustments within the college.

The increased emphasis on nontraditional, short-term, and quick-start programs has extended our class day. We now start as early as 6 a.m. and in many cases run as late as midnight.

We have designed a contract education area for business and industry so that we may have a focal point within the college to which business and industry can apply and we can respond.

Most recently, the college has assigned one full-time administrator and a number of part-time consultants to work with the Volkswagen of America Co., who have now moved a production facility and a corporate headquarters into Macomb County.

This unique arrangement was designed to assist the identification of training needs for that company and to provide the modules needed for that training. This was worked out with the unique consortium that includes the State of Michigan's Department of Education and Labor, the Volkswagen Co., and Macomb Community College.

The basic skill level of a large percentage of those people being retrained, those are unemployed as a result of changing technologies, we have found, is extremely low. Before we can begin to retrain them in one of the technological areas, we need to go back, give them basic math, basic reading, and basic communication skills.

To accommodate this, the college is developing a basic skills unit.

We have also developed a closer articulation with our college and the 30 secondary schools within our service area. We will be assuming a responsibility to work closer with secondary vocational education, both faculty and programs, to insure a continuing bridge between these two parts of the continuum.

We have also entered into a number of two-plus-two arrangements with the senior institutions whereby our students completing our programs may transfer to a senior institution and receive credit for the training at Macomb.

The Michigan Occupational Deans Administrative Council, which consists of the chief vocational technical educator of each of the 29 community colleges, has unanimously passed a resolution regarding any proposed changes in the Federal Vocational Act.

I would like to highlight some of these.

The new act must support the economic recovery and the growth of States, and it is no accident that that was chosen to be first.

We feel that should particularly zero in on States like Michigan where the recession and unemployment and retraining are most acute.

It must assist States in establishing support services for postsecondary vocational technical education programs. It must include incentives for the States to develop training programs needed for reindustrialization, for productivity improvement, and for national defense efforts.

It must provide funds for needed instructional facilities and modern equipment. The act must provide funds for individual State efforts without inhibiting the States from establishing programs required for local training needs.

It should encourage greater cooperation between postsecondary vocational technical education and other State economic development efforts.

The act must be a strong commitment to and provide for assisting individual States in updating vocational technical personnel.

And also, I would like to add the need to improve the institution's capacity to recruit and hold skilled faculty.

It must provide incentives to encourage shared training activities and resources between the business and industrial community and postsecondary vocational units.

It should provide start-up funds to establish an industrial training institute within occupational units at community colleges and postsecondary technical centers. This type institute would be an

area focal point to work directly with local industry in training needs and related areas.

There is also a significant need on a Federal level to provide much more accurate forecasting of the emerging technologies so that we might be in a better position to much more quickly provide the kind of training that is going to be needed.

Equally important to us is to continue this strong secondary and postsecondary structures now existing in States such as Michigan. We work very closely with the State Department of education and the State department of labor and the office of economic development and we think that that kind of arrangement should be continued.

Very serious financial crisis in Michigan has resulted in a major reduction in State appropriations to support its educational system.

If vocational education funds on a Federal level are not increased significantly, it will seriously undermine our ability to provide the training and services needed to meet both local and national need.

It is projected that 10 years from now, community colleges will need to provide training in areas unheard of today. We will not be able to meet this challenge without increased support from the Federal Government.

Improved vocational education is Macomb County's business, it is the State of Michigan's business, and it is the business of the country. We all benefit.

Thank you for this opportunity.

Mr. KILDEE. Without objection, we will insert your prepared remarks into the record at this point.

[Edward Lynch's prepared statement and attached document follow:]

PREPARED STATEMENT OF EDWARD J. LYNCH, DEAN, OCCUPATIONAL EDUCATION,
MACOMB COMMUNITY COLLEGE, WARREN, MICH.

Mr. Chairman and Members of the Subcommittee on Elementary, Secondary and Vocational Education. I am Edward Lynch, Dean of Occupational Education at Macomb Community College, Warren, Michigan. I am very appreciative of this opportunity to identify for you the industrial changes that are occurring within our service area, the impact those changes are having on our vocational education programming, and why I believe the Federal support of Vocational Education must be increased.

THE COLLEGE AND ITS SERVICE AREA

Macomb Community College is a comprehensive, multi-campus, two-year public institution located in Macomb County. With an enrollment of over 30,000 students, it is the largest of the twenty-nine public community colleges in Michigan.

It is the only institution of higher education in the county and serves an area which, over the past 25 years, has experienced phenomenal industrial, commercial, and residential development. It has, however, a less diversified industrial base today than it did in the 1960's.

The boundaries of Macomb County are identical to those of the college district. The county is located in the northeast portion of the Wayne-Oakland-Macomb metropolitan area surrounding the city of Detroit. It has an area of 481 square miles, including twelve home rule cities, three villages, and twelve townships.

Residential, commercial, and industrial development has expanded Macomb County's assessed valuation to over \$6.5 billion, its population to 692,000, and its employment population to about 250,000.

It is a highly industrialized county with slightly over 38 percent of its employment concentrated in manufacturing. Each of the three largest automobile companies (General Motors, Ford & Chrysler) have major installations here. Together the three employed 40,000 workers in 1981, which was about 3,500 below the previous

year. The work force is highly skilled and Macomb County probably has the largest concentration of Tool Die shops found anywhere in the country. In addition to the "Big Three" automotive companies, the county houses the new production facility of VW of America and its corporate headquarters, as well as the Chrysler Defense operation recently acquired by the General Dynamics Corporation.

Macomb County is also the home of the giant General Motors Tech Complex, several large machine equipment manufacturing companies, including Lamb Technicon, The Cross Mfg. Co., as well as hundreds of job shops.

Of the counties of Metropolitan Detroit, Macomb is the one most closely tied to the automobile industry and, as result, currently has the highest unemployment rate. In December 1981, the unemployment rate for Macomb County stood at 16.3 percent.

Macomb Community College offers programming in the traditional liberal arts transfer curriculum, and a very comprehensive offering of occupational programs.

Continuing a trend that began a number of years ago, more students now enroll in our 87 occupational programs than in the liberal arts transfer curriculum. This pattern is being duplicated around the state, where this year 131,000 adults enrolled in occupational programs, representing 51 percent of the total enrollment in the 29 community colleges.

Macomb Community College has a long tradition of serving the needs of the business, health and industrial communities. Increasingly, they are turning to us for instructional services. We now serve an employer base of over 600, which includes providing related instruction in 40 different trade areas for 1600 apprentices.

Displaced employees are also turning to Macomb Community College for retraining. For example, the college enrolled over 1,200 students last year who were sponsored by the Trade Readjustment Act, and regularly provides CETA training programs in the Technology and Health areas.

Our Educational Base will expand by increasing entry-level occupational training programs and developing programs for retraining/upgrading of current employees, thus adding to the pool of skilled manpower so vital to increased productivity. Macomb Community College will be an integral part of the economic development of this area.

Across the State the 1980-81 statistics show that 57 percent of students now entering community colleges are there to prepare for new jobs or improve job skills. (26 percent of the students enroll in occupational programs, 22 percent in business programs and 9 percent in health fields.) In the last three years alone, new courses and programs that now enroll over 11,500 students were developed at Michigan community colleges. Most of these courses and programs would not have been available in the local areas if it were not for the community colleges.

Several factors are causing the community colleges to now further expand their occupational offerings. First, demographics have changed—the 18-24 year old typical job-entry level population is declining. Second, career changes are becoming more and more common for a more mobile work force. Third, the exploding increase in the volume of scientific and technical information has created a demand for constantly upgrading the skills of the currently employed and for retraining displaced employees.

Community College must be viewed as a major educational delivery system for supporting local and statewide economic planning and development. Cooperative efforts between business, industry and the community college hold promise of improving skill levels for all workers.

Education has indeed evolved to a life-long experience. We have recognized the change. Macomb Community College has a market place orientation. It maintains a close working relationship with the community through a variety of structured interactions, including apprentice programs/cooperative internships, advisory committees, a large adjunct faculty drawn for local businesses and industrial concerns, and a standing offer to tailor instruction and services to meet specific employer needs.

CHANGES IN THE JOB MARKET

Much of Macomb County's industry is related to the manufacture of transportation equipment. Another leading industrial component of our service area is that segment that provides the design and tooling of machinery and equipment with which other manufacturers can produce goods.

The County has a major concentration of skilled trades such as pattern and model makers, millwrights and electricians. Concentrated within 25 miles of Detroit are more tool and die shops than in any other area of the world. Macomb County is located within that 25 mile area.

A number of very significant job changes are taking place in our service areas. Most of these changes are a direct result of industries increased utilization of new technologies. Examples include:

- Machinists have always been in high demand. Today the need is for computer-trained machinists and individuals trained in Numerical Control Technology.

- The expanding use of Robots within the automobile industry requires advanced training for a wide variety of skilled trade areas including welder equipment repairmen, machine repairmen, toolmakers and industrial electricians.

- (The Robotics Research Center being created in a unique partnership of State government, industry and other interests, will be located within approximately 50 miles of Macomb County.)

- The increased use of plastics and electronic components in the manufacture of automobiles.

- The increased interest in Solar and other alternative energy sources.

- The use of electronic components in an ever increasing array of applications.

- The introduction of Interactive Computer Graphics into the design field.

- The crossover of construction trained plumber/pipefitter journeymen into the industrial field.

- The first movements away from the single skill area journeyman. Among others, the VW Company of America is developing cross-trained individuals in the four maintenance trades of pipefitter, electronics, millwright and toolmaker. This trend is expected to accelerate.

- The recently renegotiated contract at the automotive companies establishing a special retraining and upgrading fund is a recognition by both the UAW and the auto companies of a need to provide skill upgrading, and for more diversified training.

- Greater emphasis on health and safety within the workplace.

- The growing need for trained technicians working with environmental concerns.

- The beginnings of a movement to expand the community college's role in the training of apprentices. This new interest is in the introduction of hands-on laboratory experiences at the college, in addition to the on-the-job training.

- The downsizing of the automobile.

PROGRAMMING AND OTHER INTERNAL CHANGES AT THE COLLEGE

To accommodate these and other changes in our service area required Macomb Community College to modify and to add new areas of study, to make a significant investment in new equipment and remodeling of the physical plant, and to make other major changes in our operating procedures and administrative organization.

The College has initiated the first steps to obtain state approval for 15 new programs over the next three years. This is on top of 10 new programs introduced within the past two years and the modification of 16 others in the current academic year.

Recent major programming changes include:

- The introduction of a Robotics program with an equipment investment of over \$300,000.

- The use of the computer in the design field required a total repackaging of each of our program design areas, an investment of over \$400,000 in equipment and remodeling of current facilities. Anticipated demand for hands-on experience in the use of the integrated computer graphics equipment will require the operation of that lab 24 hours a day, seven days a week.

- The introduction of courses in non-destructive technology into our curriculum to accommodate the demand for increased product reliability and safety. The cost for that equipment is in excess of \$100,000 with another several thousand for installation and for remodeling.

- The introduction of more and expensive highly sophisticated electronic equipment and instruction into our electronic engineering technology program. This program was completely redesigned about three years ago and requires constant review and frequent modification to remain current with the rapidly changing technology. The enrollment in the electronics program has more than doubled in the last five years and is projected to double again within the next three years.

- The demand for computer-trained machinists has been on the increase. This year another full-time faculty member was hired and remodeling will take place this summer to increase the space allocated to this program. Both the Metals Machining and the Numerical Control programs are being modified.

- A new program in Solar and Alternate Energy Technology was developed this year to meet the demands from industry. This program will be available to new stu-

dents and is anticipated to also attract individuals now trained and employed as heating, cooling or refrigeration experts.

The increased emphasis on quality assurance in manufacturing required the purchase of laser equipment and introduction of its use into our metrology program.

A considerable expansion of equipment and staff in the Data Processing/Computer Programming curricula along with a significant investment in a new computer and peripheral equipment.

Development of a program in Word Processing and a significant investment in equipment and remodeling.

The design of a series of courses in the plastics technology.

In addition to changes in vocational-technical programs, other significant adjustments have been made at the college in order to be positioned to meet the increased challenge for training, retraining and upgrading.

The increased emphasis on non-traditional, short-term and quick-start programs has extended our class day in a number of areas to begin as early as 6:00 a.m. and run until midnight. (This month, for example, we entered into a contractual arrangement with the Department of Labor supported Downriver Community Conference to provide Robotics training. In order to accommodate this need, the first group of unemployed students had to be scheduled around our traditional classes. This resulted in programming spread over a long stretch of the day and in some cases runs until midnight.)

We have designed a Contract Education area for business and industry. Recent efforts in this area include training as routine as introducing a limited-use welding program for the Michigan Bell Telephone Company—to a highly complex program in Metrology Calibration for a group of General Motors Mexican employees (most of whom, while well educated, were not fluent in the English language). It is through this Contract Education effort that this College will arrange to meet the increasing demand for short course and quick start programs. To accommodate this need the college had to make a major internal organizational change.

The College has assigned one full-time administrator and a number of part-time consultants to work with the VW Company. This unique arrangement is designed to assist in the identification of training needs and development of modules to deliver the training. Members of the consortium include the State of Michigan, Departments of Education and Labor, VW and Macomb Community College.

The basic skill level of a large percentage of those recently unemployed as a result of changes within the automotive industry is very low. Before they can be retrained in one of the emerging technological areas, they require an upgrading of reading and math skills. To accommodate this need the college is developing a Basic Skills component. This new unit will assess and program students on an individual basis. (This required a shift of internal resources into this new unit since no new funding is available to support this activity as a continuing effort.)

There has been significant programming progress made in the close articulation of the College with the 30 secondary schools within our service area. Within the past two years, gains have been made to integrate the advanced secondary school training into the introductory-level college courses, in an effort to accommodate and accelerate the students' program of study. One of the spinoffs of the above effort was the first of what will be several programs across various curriculums to assist in the introduction of high school vocational education faculty to some of the new technology and equipment. We will be assuming a responsibility to work closer with secondary vocational education faculty and programs to ensure a continuing bridge between the two parts of this continuum.

PROPOSALS

The Federal government has played a significant and vital role in the support and improvement of vocational education at both the secondary and post-secondary level. To withdraw from this commitment would be disastrous to vocational education. Rather than reduce the level of support it should be greatly increased.

On March 12, 1982, the Michigan Occupational Deans Administrative Council, which consists of the chief vocational-technical education administrator from Michigan's (29) public community colleges, unanimously passed the following resolution regarding a Federal Vocational Education Act:

1. The federal government must pass a vocational education act supporting the economic recovery and growth of states, particularly Michigan, where the recession has had a debilitating effect.

2. The Act must be a strong commitment on the part of the federal government to assist states in establishing support services for post-secondary vocational-technical education programs.

3. The Act must include incentives for the states to develop training programs needed for re-industrialization, productivity improvements and national defense efforts.

4. The Act must provide funds for needed instructional facilities and modern equipment.

5. The Act must provide funds for individual state efforts, without inhibiting the states from establishing programs required for local training needs.

6. The Act must encourage greater cooperation between post-secondary vocational-technical education and state economic development efforts.

7. The Act must be a strong commitment to and provide for assisting individual states in updating vocational-technical personnel.

Additionally, I recommend consideration of the following points for incorporation in the new Act:

1. Improve the institution's capacity to recruit and hold skilled faculty.

2. Provide incentives to encourage shared training activities and resources between the business and industrial community and post-secondary vocational education units.

3. Provide start-up funds to establish Industrial Training Institutes within occupational units at Community Colleges and Post-secondary Technical Centers. This type institute would be an area focal point to work directly with local industry in training needs and related areas.

4. Equally important, continue to utilize the strong secondary and post-secondary structures now existing in states such as Michigan.

The considerable efforts and the tangible results accredited to vocational-technical education in Michigan would not have been possible without the strong support of the Federal government working cooperatively with Michigan governmental agencies and local educational units.

The very serious financial crisis in Michigan has resulted in a major reduction in state appropriations to support its educational system. If Federal vocational education funds are not increased significantly it will seriously undermine our ability to provide the training and services needed to meet local needs and national needs.

Those individuals requiring training, retraining and upgrading will be unable to obtain it, and Macomb County, Michigan, and the country as a whole will not have the trained personnel required to meet the challenge of the 80's and 90's.

It is projected that ten years from now community colleges will need to provide training in areas unheard of today. We will not be able to meet this challenge without increased support from the Federal Government.

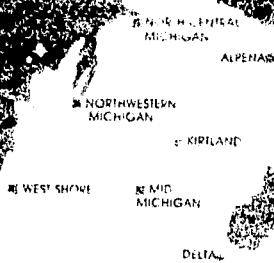
Improved vocational education is Macomb County's business, the State of Michigan's business and the business of the country. We all benefit.

Thank you for the opportunity to share these thoughts on vocational education with you.

The Role of Community Colleges in Michigan and Its Economy

Michigan community colleges are making significant contributions to the State's economy and this trend is expected to continue as a positive influence in the future.

Both in the short-term impact on students well prepared for a changing employment market and long-term investment in the human capital needed for Michigan can look with confidence to community colleges as a major force in the future.



Less than two cents from each dollar of local and state taxes are used to provide operational support for these colleges.



Additional operational support comes from tuition, fees, and private gifts. In return for this investment, Michigan community colleges provide a substantial share of the skilled employees needed for the economic success of local businesses and industries. And, with plans in Michigan to draw high-technology business and industry into the state, community colleges will be of vital need. Indeed, one of the critical necessities in the successful execution of this goal, the present and future community colleges can be viewed as essential to the state's future.

Who attends Michigan community colleges and why?

Enrollments at Michigan community colleges continue to increase and have increased by over 73 percent since 1970. The changes since 1970 in these students reflect more than just increased numbers, however. Who is attending and why they are attending have also changed.

1. **Mature adults** in increasing numbers are being served by Michigan community colleges:

1 out of 2 students is 24 years old or older

1 out of 4 students is 30 years old or older

Only 1 out of 5 students is 19 years old or younger

This is a dramatic change from the early community and junior college days when the majority of the students were right out of high school.

Approximately 76 percent of the students are employed, including over 40 percent who are employed full-time.

In order to meet the needs of this large number of older and employed students, the community colleges offer approximately 34 percent of their courses during the evenings and on weekends.

2. **Women** now outnumber men in community colleges:

Women	54%
Men	46%

Many of these women are mature women who are preparing to enter or return to the job market.

Of the women students, 32 percent are 30 years old or older, compared to 23 percent of the men.

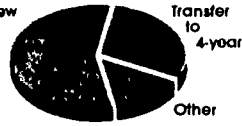
3. **Minority groups** are well represented in today's community college enrollments. Approximately 37,000, or about 16 percent, of the students enrolled in Michigan community colleges are members of minority groups.
4. **Veterans** are well represented on the community college campuses. Of all the veterans receiving education benefits in Michigan, approximately 54 percent are enrolled in community colleges.
5. **Displaced employees** are also turning to the community colleges for retraining. As examples, during 1980-81:

22 community colleges enrolled over 2,200 students in the Trade Readjustment Allowance program.

27 community colleges provided CETA programs for over 5,000 students.

During 1980-81, more than twice as many Michigan community college students enrolled in order to prepare for a new job/improve job skills as enrolled to transfer to a four-year institution.

Prepare for new job/improve job skills



This is a significant change from the early junior and community college years, when a greater portion of students attended with the intention of transferring to a four-year institution.

What are the students enrolled in at the community colleges?

Over half of Michigan community college students report that they attend to gain or improve employment skills.

This is borne out by the areas in which students actually enroll:



During Fall 1980, 126,500 students enrolled in Michigan community colleges in courses or programs designated as occupational in nature:

Over half of these students were women. Approximately one in six were minorities, including Blacks, Hispanics, and American Indians.

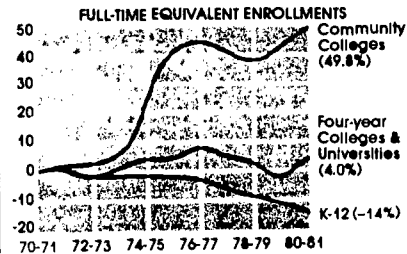
These students included:

21,000 Disadvantaged students;
800 Handicapped students;
700 Limited English proficiency students;

all groups which typically have had high unemployment.

How have attendance patterns changed during the past decade?

Since 1970, elementary and secondary (K-12) enrollments have declined, and four-year college enrollments have leveled off. Community colleges, however, have continued to grow.



The actual number of students attending community colleges increased even more dramatically — from 1970-71 to 1980-81, four-year institution headcount enrollments increased about 11 percent, while those of the community colleges increased by over 73 percent. This is in part due to the fact that an increasing number of students in postsecondary education are attending part-time.

Enrollments increase even more dramatically during recessionary periods as Michigan residents turn to community colleges for improving job skills, for re-training, and for new careers. During the 1974-75 recessionary period, the number of students attending community colleges increased 12 percent the first year and 15 percent the second year. During the first year of the current recession (1979), the number of students attending community colleges increased by another 12 percent.

What are the community colleges doing to help business and industry?

Courses: Community colleges offer programming which specifically meets the needs of the businesses and industries in their areas. Both employers and their employees recognize the importance of these courses to their job performance. During 1980-81:

2,800 Employers paid for **30,000 Employees** to take courses for job improvement

Contract Programs: In many instances, businesses and industries contracted directly with the community colleges to provide training for their specific needs. For instance, industry contracted with educational institutions for apprenticeship training for 16,350 students in the state — over 12,000 of these apprentices attended community colleges.

As other examples, in 1979-80, members of the banking industry contracted for American Institute of Banking courses for over 2,500 of their employees, and other companies and industries contracted for specific training for over 4,500 of their employees.

Included were such courses as engineering refresher, language training for foreign employees of multinational corporations, and quality control for nuclear technicians.

Similar contract programs were provided for the public sector. Social service agencies contracted for:

Training in adult foster care for over 1,600 individuals.

Day care provider training for 700 individuals.

Other public-sector agencies contracted for staff training for over 8,000 employees.

The community colleges provide a great deal of professional upgrading/continuing education unit courses that are in addition to their regular academic scheduling. For example, **professional upgrading courses** were provided for:

Over 3,000 members of the professions
3,700 Business persons
2,500 people employed by industry
Over 3,000 Public service agency employees

Conferences and seminars were provided across the state for professional upgrading for:

Over 5,000 Business persons
3,500 Professionals
2,000 Individuals employed by industry
9,000 Public service agency employees

Although the figures are not yet complete, the estimates show a substantial increase for 1980-81.

How have the community colleges met regional needs?

The goal of Michigan community colleges, typically, is to meet the needs of their immediate service areas and regions, rather than attempting to compete with institutions in other areas. There are several indices of how successful they have been at this:

1. Most of the students at the community colleges are residents of their own community college district, and most of them commute to their college.



2. The community colleges have planned their programming around the needs of their local areas and residents.

Nursing programs are located in all areas of the state, responding to the statewide shortage of registered nurses. American Institute of Banking programs respond to needs of the banking industry in all areas of the Lower Peninsula.

By contrast, apprenticeship programs are concentrated primarily in the southern half of the Lower Peninsula, where most of the manufacturing is located. Almost 98 percent of the students in apprenticeship programs are at institutions in the southern half of the Lower Peninsula.

Nursing

Banking

Apprenticeships

On a smaller scale, wood harvest safety, forest technology, and forestry are concentrated in the Upper Peninsula and northern Lower Peninsula, where the timber industry is primarily located.

Ski area management is offered in the Upper Peninsula, while concrete technology is only offered in the northeastern Lower Peninsula, where the limestone quarries are located.

- Community colleges work closely with their communities in developing new programs and courses. The community colleges work directly with representatives of business, industry, and the public sector in determining educational needs and in developing courses and programs designed to meet their specific needs.

In the last three years alone, new courses and programs were developed in this manner that now enroll over 11,500 students. Most of these courses and programs would not have been available in the local areas if it were not for the community colleges.

What role can community colleges have in diversifying the economy of the state?

Over the past two decades, Michigan community colleges have significantly expanded their role in the community. During the early 1960's, they were often known as "junior colleges," and their primary purpose was to provide the first two years of coursework leading toward the baccalaureate degree.

This purpose was expanded during the late 1960's and early 1970's to include programs in community education and in occupational education. During this period, they became known as "comprehensive community colleges."

Most of the early occupational programming was to provide students with job entry skills, as the number of high school graduates entering the job market was increasing every year. Typical of the programs developed during this period of time were one- and two-year programs in fields such as automotive and electronic technology, auto body repair, nursing, radiologic technology, hotel/motel management, data processing, and secretarial.

Several factors are causing the community colleges to now further expand their occupational offerings. First, demographics have changed — the 18-24 year old typical job-entry level population is declining. Second, career changes are becoming more and more common for a more mobile work force. Third, it is now estimated that the volume of scientific and technical information doubles approximately every eight years, which creates a demand for constantly upgrading the skills of the currently employed and for retraining displaced employees.

Evidence of these factors is found in the fact that an even larger portion of the students attending community colleges are coming for job upgrading and retraining and that many businesses and industries are turning to the community colleges for these instructional services.

Entry-Level Training 1970 1980 1990

Job Upgrading/
Retraining

As an example, in 1980-81 business and industry contracted for training for over 19,000 of their employees. The community colleges have responded by building instructional foundations in the technological and business fields which can be expanded in future years. Instruction is now being offered in areas such as computer graphics, robotics, microprocessor technology, word processing, and small business management.

Program and course planning for the future continue this trend of responding to current and anticipated needs. Examples of courses and programs planned by the community colleges for the near future are energy technology, computer-aided manufacturing technology, pre-apprenticeship training, and petroleum engineering technology.

While entry-level occupational training at the community colleges will continue to provide additional skilled manpower to the state, many of the proposed programs and courses are to update current employees on new technology in their field.

Now that the educational base is established, community colleges are in a unique position of being able to expand on this base to both meet the needs of current businesses and industries and to attract new businesses and industries to the communities.



By providing a pool of skilled manpower and the means for upgrading existing employees, community colleges will be an integral part of the economic development of the state and the local communities.

This research report was sponsored by the 29 publicly-supported community colleges of Michigan

Research Committee

Dr. Gene Packwood, Delta College, Chairperson
 Ms. Nancy Woods, Kalamazoo Valley Community College
 Dr. Diane Smolen, Lansing Community College
 Dr. Richard Galant, Washtenaw Community College

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Any information in this report may be used as necessary. Additional copies are available from your community college.

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Mr. KILDEF. Dr. Carnevale?

STATEMENT OF ANTHONY CARNEVALE, ECONOMIST, AMERICAN SOCIETY FOR TRAINING & DEVELOPMENT, WASHINGTON, D.C.

Dr. CARNEVALE. Good morning. I am Anthony Carnevale, speaking on behalf of the members of the American Society for Training & Development, ASTD.

ASTD's members, totaling nearly 50,000, are engaged in employer-provided education, training, and retraining for the Nation's work force and are the consumers of the vocational education product. For this reason, we have an immediate and ongoing interest in the Vocational Education Act and its reauthorization.

First, let me say that there is no question that vocational education has an important role to play in the revitalization of the American economy. Unlike other industrialized nations, however, the United States has paid little attention to the role of human capital in the Nation's economic adaptability, productivity, and competitive advantage.

As a result, until very recently the importance of vocational education in the overall performance of the economy has been largely ignored. Employer-provided training has been similarly ignored by public policymakers. ASTD estimates that employers spend upward of \$40 billion annually on the education and training of their employees.

We have never really made the connection between training and economic performance in our public policies. As a result, we have promoted insufficient collaboration between public and private training. The economic connection is real. According to the available research on economic growth, between 1948 and 1979, human capital improvements accounted for a larger share of productivity growth than machine capital.¹

In spite of that fact, current public tax incentives, such as those in the current National Recovery Act, are heavily biased toward machine capital. At the same time, in the private sector it is often the case that one employer invests in training and another in wages to bid away trained personnel. The overall effect is a likely national underinvestment in human capital.

We continue to ignore the importance of the human factor in our overall economic performance at our peril. A recent series of studies suggests that our failing competitive advantage in foreign markets owes, in part, to this underinvestment in human capital.

Most recently, the Bureau of International Labor Affairs reports that the decline in U.S. trade performance since the 1960's is the result of differences in the growth of net real investment in equipment and in the acquisition of labor skills through education and training. Between 1963 and 1975, the U.S. share of the world's skilled workers fell from 29 percent to 26 percent. Internationally, we have dropped from second to seventh in the "skill endowments" of our workers.²

¹ Edward F. Denison, "Accounting for Slower Economic Growth: The U.S. in the 1970s," the Brookings Institution, Washington, D.C., 1979.

² "Changes in the International Pattern of Factor Abundance and the Composition of Trade," economic discussion paper 8, U.S. Department of Labor, Bureau of International Labor Affairs, October 1980.

As a nation, we have arrived at a perplexing point where we experience both high unemployment and skill shortages. What is more, shortages are likely to become more severe. Massive new public commitments to surges in defense and energy production will likely result in further shortages and consequent inflationary bottlenecks to production. Our military buildup guarantees that in addition to policies to insure an available skilled work force for military production, we will need to carefully cater to the skill requirements of civilian industries lest they become starved for skilled workers and capital.

The need for accelerated investment in human capital will become even more urgent in the future as most of our labor force growth will come from women and minorities, where our current deficits in human capital are greatest.

Women will make up fully two-thirds of the labor force growth between now and 1990.³ While the proportion of other population groups will decline, minorities will comprise an increased share of the population and labor force.

We will no longer be faced so much with the problem of finding private sector work for women and minorities as much as increasing their productivity sufficiently to justify higher wages.

There are other ominous trends that will require more and more of our existing training capacity. The current productivity crisis cannot be resolved unless American workers learn to work smarter, not harder.

Rapid international economic adjustments will require a flexible and adaptable work force. The aging of the work force will make that adaptability difficult without constant retraining.

Moreover, as we become more and more a service economy, our productivity will depend more and more on human skills and not machine capacity.

Finally, the aging of the work force will require greater output per worker.

The ratio of workers to nonworkers has declined and will decline radically in the future.⁴ Marked increases in worker productivity will be required to support the after-tax earnings on workers at reasonable levels and to maintain a growing dependent population.

We will need more education and training, but it is not clear that substantial new resources will be available to pay for it, making the quality and coordination of our current vocational education and private training all the more important.

The committee should realize that we are entering a period when government funds available for human resources spending will be increasingly scarce.

An analysis of national income accounts shows that personal educational spending will decline as the baby boom population ages and begins forming families. Private citizens who have heretofore spent a great deal of money on education and training will want to put their money into houses, cars, and other consumer items.

I need not tell this committee that appropriated funds are scarce. Moreover, it will be difficult to fund any of the recent proposals to

³ Bureau of Labor statistics projections for 1990.

⁴ Social Security Subcommittee of the Senate Finance Committee.

fund education and training through tax credits. There is little left in the Ways and Means cookie jar after last year's tax bill.

Finally, recent proposals for universal education and training entitlements funded through employer-employee contributions are not likely. We have already put too much pressure on payroll and income taxes.

In short, if we are to build an education and training system for the eighties, it will have to be crafted from current institutional arrangements, public and private.

Let me now turn to three immediate training needs and our view as to vocational education's role in responding to them.

The first of these needs is job-specific training and retraining for mainstream workers. Job-specific training is and ought to continue to be the primary responsibility of the \$30-\$40 corporate training enterprise. Private firms undertake job-specific training for new employees in order to tailor their basic vocational skills to the particular requirements of production in individual firms.

Private firms are also committed to recurrent job-specific retraining. The competitive discipline of the marketplace insures consistent retraining in private firms to adapt human skills to new products, new modes of production and to integrate human with new machine capital.

Private firms are first impacted by shifting training requirements that come with new products and new technologies. Private firms are therefore most able to provide job-specific training relevant to the cutting edge requirements of the Nation's economic growth.

Privately directed training is not only most relevant, it is accountable to the rigorous discipline of consumer preferences in a competitive economy.

Demography pretty well guarantees that, in the future, training will have to be more job-specific. With the baby bust and receding incentives for early retirement, the labor force will age.

The training client will come more and more as an adult with prior work history, ready for job-specific training or retraining.

As a result, job-specific training, currently the province of the private trainers, should become an increasing proportion of the Nation's total education, training, and retraining.

[EDITOR'S NOTE.—The paragraph in the written statement which was omitted in oral testimony follows:]

In spite of its proven economic value, there is evidence of an under-investment in job-specific training. With the high cost of training, some private firms tend to pirate trained workers from one another rather than provide their own training capability. Smaller firms cannot generate sufficient trainee populations to avail themselves of the economics of scale necessary to make in-house training economical. Public tax incentives tend overwhelmingly to favor investments in machine capital over human resources development. We need to encourage more job-specific training.

Dr. CARNEVALE. If we are going to provide additional public subsidies for job-specific training, we should maintain and strengthen private involvement. Those who propose public subsidies should attempt, to the extent possible, to leave job-specific training decisions and content with private firms.

Firms should be encouraged to either provide their own training or acquire it from vocational education and other providers. We recognize that, while private firms should instigate job-specific training, private trainers need not necessarily provide all job-specific training.

Indeed, smaller companies which do not generate sufficient training needs to justify an in-house training capability will want to acquire training according to specification from vocational education or other public and private providers. All job-specific training, however, should be disciplined by workplace requirements and job specifications of individual firms.

Publicly subsidized and privately acquired job-specific training would reward those vocational educators who are already responsive to the training needs of the workplace.

In the current financial environment, however, we can no longer afford to waste the training capability of vocational educators that are still unresponsive to the training demands of the workplace.

We need to find a way to link vocational education and private training more closely. The approach taken by Congressman Miller in H.R. 5820 may be one effective means to do so. That bill provides for matching Federal funds in vocational institutions to the ability of the individual vocational education system to attract private contracts.

The second need is basic vocational training for occupations. Generic vocational skills are those entry-level skills learned in vocational programs in preparation for employment and professional careers. Generic vocational skills do not generally make individuals ready for specific jobs in individual firms.

Additional job-specific training provided by private employers is usually necessary to ready individuals for specific jobs in particular firms.

In recent years, however, employers have noted that increasing amounts of additional training have become necessary to make entry-level employees job ready.

In the future, accelerating technological and economic change and changes in the state-of-the-art in all occupations and professions will inevitably widen the gap between entry-level vocational skills and the actual skill requirements of private production.

To be sure, occupational skills are provided by vocational education institutions and are not generally taught by employers.

Employers, however, are the ultimate consumers of vocational training and should be the principal influence over curriculum content in education and training for occupations.

In order to close the widening gap between occupational skills provided by vocational institutions and job-specific skill requirements, and to increase the relevance of vocational education, ASTD favors a range of incentives to promote greater collaboration between vocational education institutions and private firms. These incentives include the following:

One, an expansion of the current cooperative education concept included in Federal vocational education provisions to include incentives for public and private collaboration on curriculum and training procedures;

Two, matching funds in Federal elementary, secondary, higher education, and training legislation for cooperative education and only for those programs demonstrating significant public and private collaboration.

Three, expanded tax benefits to allow private firms to donate equipment to secondary and postsecondary education and training institutions, and to defray the costs of sharing equipment, facilities and personnel with elementary, secondary, postsecondary education and training institutions.

Four, provisions to require greater consultation with private industry on curriculum content in vocational education programs.

The third need is to alleviate the skill shortages problem. It is our view that no single policy or delivery mechanism can be relied upon for resolving the skill shortages problem. Skill shortages can be nationwide or regional; may be peculiar to specific economic sectors or economywide;

May require training responses that range from occupational to job-specific training and retraining; and may arise in occupations or professions with widely different education and training requirements.

Efficient remedies for specific shortages should be considered on a case-by-case basis. In addition, given the shifting character and temporary nature of skill requirements, delivery systems for addressing skill shortages need to be flexible and impermanent.

I would note that the current skill requirement of machinists—if you look over the data on the fluctuation in machinists' work over the past decade, you show variation almost on an annual basis by 15 to 20 percent.

Those numbers are characteristic of most occupations and professions. Those numbers are also characteristic of the general movement of the economy in terms of which sectors are more important than others.

The economy itself is always in flux and it is very difficult to set rigid systems to respond to it.

Rigid and narrow legislative arrangements which rely exclusively on vocational education or any other education and training institution responding to specific skill deficiencies are self-defeating.

A shortage, for instance, of engineers requires the training efforts of postsecondary institutions. A shortage of computer technicians, on the other hand, could be remedied through a variety of providers such as public vocational education, proprietary schools, and even private firms. Strategies for addressing skill shortages in each of these areas should vary accordingly.

In all cases, however, the content of training intended to be responsive to specific job needs should be governed to the extent possible by the training specifications of employers. Some form of mandatory collaboration or certification by private employers should be attached to receipt of public subsidies for all job-specific training.

That concludes my testimony.

Mr. KILDEE. We will have some questions of the witnesses now. Your testimony has created an excellent record for this committee and we appreciate it.

You all mentioned the need for the use of modern equipment in training. But given the high cost of equipment, especially new high-technology equipment, how can public institutions, particularly, keep current?

Can you think of any ways that the Federal Government or industry can help you in keeping current with the equipment needs?

Anyone of you may comment or all of you may join in.

Mr. HOBSON. I would like to make one comment on the equipment issue. What we have done in Ohio is that when a specific piece of equipment, for example, let us take a hydraulic trainer or a CNC, we try to lease that equipment and then we ship it around from school to school or vocational program to vocational program wherever industry's specific need is.

The equipment that is donated by industry always is not first rate because of proper tax credits. I think some tax credits relative for industry to donate equipment and machinery that is appropriate for training would be helpful.

Mr. BAKER. I mentioned in my testimony, Mr. Kildee, I think this is a critical issue in that the answer may come in a total new approach to equipment acquisition.

I think you have two basic questions. If you are looking at occupation-specific training you can possibly purchase certain kinds of generic equipment or lease it. But because of the wide variety of new kinds of electronic devices that are being brought into the office and the industrial workspace, I think when you are looking at industry-specific training, it has got to be a direct relationship between the particular industry and the institution and may include processes such as loaning the equipment to the facility on a temporary basis or even totally changing around the training activity to bringing the people in-house.

And from my quick survey of industries that are experiencing this revolution themselves, they are so attracted by the opportunity of positive relationship with the vocational centers and so fearful of their own inability to repair the equipment that they are not even turning it on until they have had an opportunity to bring the vocational people in to help them put a training program together for the equipment, because they are not capable of running it.

We have to recognize too that the equipment is changing so rapidly that the purchase processes were perhaps not relevant.

Just looking at a typewriter or a word processor, what we bought 3 years ago will be completely obsolete next year. They may already be obsolete.

So, even in the office training, I have noticed that a number of area vocational centers are trying to establish a continuous lease-back arrangement with major producers of word processors so that they can change the equipment on a year-to-year basis.

The capabilities of microprocessors are changing rapidly. Basically, by 1985 they are going to be just much more sophisticated than they are today. Therefore, the old way of purchasing and putting in there for 5 years or getting castoffs from industry is just not going to be relevant in the future.

As I mentioned, I suggest the Federal Government can help by compiling all of the different ways that people are doing this and getting that at on the street to the vocational community quickly

so that they can begin to negotiate such agreements with their own industry.

Mr. KILDEE. Mr. Lynch?

Mr. LYNCH. We would support that. At Macomb Community College, we do provide a lot of onsite training. That is very helpful for the occupational-specific training for that one industry or that one employer.

The difficulty that leaves us with is adding to the pool of skilled people. There does need to be some kind of incentive for business or industry to enable us to use that equipment, the latest technology, in the classroom, hopefully at our site, for which they would receive some type of tax incentive, perhaps, or writeoff incentive.

We would be comfortable even being able to borrow that equipment on a short-term basis, recognizing that the company might suffer financial loss. We would encourage some way of accomodating that kind of a loss.

Mr. KILDEE. Dr. Carnevale?

Dr. CARNEVALE. I would echo the comments of others here that some sort of a change in Federal tax law would be helpful and expansion of existing gift-tax provisions would be one way to go or a separate tax credit would be a second.

I think that would be insufficient, though, in the long term and that it would create some problems. Equipment comes in various ages and qualities, and you would want to give a company more of an incentive to dump more state-of-the-art equipment, rather than equipment that is used and already fully depreciated.

I think you would need some sort of a system, maybe on a State-by-State basis, to distinguish between or among different kinds of equipment and where it ought to go.

For instance, it seems to me that in postsecondary vocational education institutions, you want very much state-of-the-art teaching equipment.

In secondary schools, I think you can afford to take on equipment that has in fact been fully depreciated and used by the private system altogether.

In the case of the auto industry, for instance, in a postsecondary institution, you would want to avail vocational teachers of the latest robots. In secondary schools, many of which—while the auto workers are using robots—are still using ratchet wrenches, it would not matter much what kind of robot you gave them. It could be 8 years old. It would at least give a secondary school student some familiarity with the notion of a machine of that kind, not necessarily state-of-the-art machinery.

But the other route that I would suggest, which I think in the long haul is probably more productive, is the notion that we have got to move toward some sort of a mixed system. Shortage of teaching personnel, shortage of space and equipment all point, I think, in the same direction.

You must add to that the fact that most of the trainees in the future will be adults; 60 to 70 percent of the work force that we will have by the late 1990's is already in the work force.

The aging of the working population is proceeding rather rapidly. And more and more, the person who needs training will be an

adult with prior work experience. They are not going to want to go back to high schools.

In fact, in many cases, they will not want to go back to a classroom situation at all. We are going to have to be a little bit more creative about where we train them and how.

So, given that, I would suggest that we also emphasize this notion of sharing facilities. There is no reason why you cannot have vocational personnel training in factories during off-peak use of machinery and training facilities. There is a lot of that available out there that is unused.

There is no reason why you cannot share personnel, equipment, and facilities back and forth, I think, rather easily. That would also require, I think, some tax provision to pay for, at least, that cost, the contribution of the private system in that event, and I suspect to add some additional incentive on the public side.

Mr. KILDEE. Mr. Lynch, to what extent is your institution doing any on-site training in Macomb County?

Mr. LYNCH. We do a considerable amount of on-site training. We do it in the General Motors technical complex, which you are familiar with. We frequently use their instructors, use their equipment, and that is great for that type of operation for not only that occupational-specific but employer-specific.

That happens on a regular basis.

Mr. KILDEE. Is this training for new employees, retraining for old employees or both?

Mr. LYNCH. Both.

Mr. KILDEE. But all are the employees of the company?

Mr. LYNCH. Correct.

Mr. KILDEE. So, their workman's compensation and other benefits are already covered. There is no insurance problem.

Mr. LYNCH. The shortcoming is that we are unable, then, to add significantly to the supply.

Mr. KILDEE. To the work force.

Mr. LYNCH. We train and upgrade current employees.

Mr. KILDEE. To what extent, in general, is job-specific training a growing component of vocational education? Mr. Hobson?

Mr. HOBSON. Mr. Kildee, I think it is the key element. Of the 100 or so companies that the division of vocational education and the development department are working with now, they are all specific company training.

Of the \$5 million that we have spent on that program and some 62,000 individuals who have been trained and retrained, they have all been retrained for a specific company either at the plant or at an adjacent school.

So, in Ohio's case, it is complete.

Mr. KILDEE. Mr. Baker?

Mr. BAKER. Certainly that is true also, Mr. Kildee, in terms of Illinois, that the commitment of the vocational education program to economic development, a transition from them seeing themselves as in a purely education role to seeing themselves in a dual role of generators of new economic development opportunities through training, is now I would say, with their education and pre-training purpose.

We certainly have seen it both through the HITS program that I mentioned and through an industrial training program that is paid for entirely out of the general funds of the State of Illinois in which the vocational education community supports the program.

Training is paid for and salaries of new workers are paid for with State money, but we are using the vocational education community in the factory to effect this training. So, it is extremely important.

Mr. KILDEE. There is a question parallel to that in Michigan, particularly, but it is also true of Ohio where your unemployment situation is severe.

In my area people who are unemployed find themselves with the available time and the need for new training. I know, for example, more people are attending Mott Community College in Flint, because of these two factors. Are you reaching at Macomb College in certain areas the limits of your staff and equipment capacity?

Mr. LYNCH. A good example, recently we entered into a contractual arrangement with the Department of Labor sponsored Donn River Community Conference, of which you may be familiar.

We were providing robotics training to a group of unemployed from that end of the city. In order to accommodate that group, and there were 25 students in that first group and we anticipate that we will be in the hundreds over the next couple of years, an additional investment is required in equipment. But more importantly, it involved changing our whole structure within the mechanical-tech division.

We now run courses to accommodate the Donn River group between, before and after the ongoing program, the regular mission of the college. Those students come early in the day. They may have a class in the morning; they may have one again in the afternoon; they may have one that begins at 10 at night.

It is the only way that we could accommodate that kind of training. If we had the luxury of separate labs sitting there just for contract education, which is one of the anticipated goals of an institute arrangement, we would be able to be much more flexible, much more accommodating.

For the robotics training for the Donn River group, we put together a very concentrated package. It began about 3 or 4 weeks ago and it will run until the middle of December.

We are accelerating that program. That would normally be a year and a half of the traditionally 16-week, 3-hour-a-week type of course.

We could do much better. We could shorten that time span considerably if we had had additional facilities and additional equipment.

Mr. KILDEE. Before I turn to the gentleman from Minnesota, I have one further question, which I will address to you, Mr. Lynch, but to which any of you may respond.

The General Motors Corp. has indicated an interest in constructing a robotics industry in southeast Michigan in conjunction with Japan.

Has there been any contact from General Motors with your institution regarding that?

Mr. LYNCH. Not regarding that. We have had some contact with them trying to recruit some of their people that we hope will be displaced with the new venture between the Japanese company and General Motors.

We are desperate for trained faculty to help us out in that area. We work very closely with the General Motors technical center and the robotics division of General Motors began in that tech center.

Mr. KILDEE. Mr. Erdahl from Minnesota.

Mr. ERDAHL. Thank you very much, Mr. Chairman. I regret some other meeting kept me away from this one. I certainly want to commend the chairman and all of you that are here today to talk about, I think, a very important subject, how we look to the future and how we can have cooperation and coordination between the educational sector, especially in the vocational training and the private sector so we not only have some jobs available, but we have people with skills to handle those jobs.

The question I have is that as one looks at these very sophisticated—to me, at least—possibilities down the road about microelectronics and robotics and what not, are we going to be able to train people right out of the high school with skills to move into these fields, or are they so sophisticated that we are going to have to see people going in there, taking, in a sense, on-the-job training and probably getting them out for some training again?

I am not sure if I am making my question clear. I see several people nodding. Maybe you could just touch on that subject. It seems to be one that we should be willing to look at and try to come up with some possibilities, at least.

Mr. LYNCH. We see training in robotics, specifically, at two levels, and we are providing that training currently.

You are correct. The welder-maintenance repairman, the advance electrician who is already a journeyman in the shop is going to be required to retrain additional knowledge in order to work in the field of robotics.

So, we developed a program in concert with our apprentice programs.

In addition to that, we do have large numbers of people maybe coming right out of high school or coming with limited educational background in any of the related areas: hydraulics, electronics, and so on.

Yes. The program is in place for them. It is a little different. It begins at a much lower level. It has a much broader base, but it can be done and it has to be done.

The number of skilled tradespeople today who are going to have to move into the robotics area is not sufficient to meet what we project to be the need.

Mr. BAKER. Mr. Erdahl, I think that when we talk about high technology, all of us tend to think about the jobs as being very sophisticated.

Certainly in the repair area, in the creation of new high-technology devices, and the engineering phases, it is sophisticated. But there are many jobs being created and ones we do not even recognize yet out of this process that do not require that sophisticated

training. They may require a different way of viewing the job and the workplace.

It is my contention, and it is certainly unfounded right now, that the young people by the time that they graduate from high school are going to be so inured to the electronics revolution simply from their access to electronics games from the time they are about three that they will be much better prepared than we for this new workplace.

Further, many of the devices, particularly in the office workplace, are created through their software packages to teach the young people how to use the systems.

You walk someone right in and sit down and they punch buttons and as in their education program, the systems have a way of teaching them.

I think that the key thing that we have to look at in the education community at the high school and even at the elementary school level is how to build the psychological base and the attitudes that makes an easy positive transition for these young people into that kind of a work place.

Mr. ERDAHL. I think that is a very valid observation. I think that as I look at our own kids, they are much less intimidated by computer buttons than some of us who have survived a few more birthdays. That is the coming wave of the future.

Thank you very much. Thank you, Mr. Chairman.

Mr. KILDEE. It is really interesting that this new generation seems to have less hesitancy in approaching that type of equipment, because perhaps of their experiences with similar machines used for recreation.

It is really incredible the almost geometric progression by which technology has advanced such that even young people are becoming accustomed to using high technology in everyday life.

The President of the United States has proposed that in a 2-year period, from 1981 to 1983, a 36-percent or 37-percent cut take place in the funding of vocational education. He is trying to negotiate with Governors now as part of the New Federalism to phase the Federal Government out of vocational education.

With the need to reindustrialize our country, do you think cutting back on vocational education is a prudent thing for our Nation to do? Are there certain national purposes in education that the Federal Government should continue to be involved in?

I come from a city where obviously we are impacted heavily by a new type of technology that exists in Japan. Foreign automobiles are being imported to this country in great numbers, and I know myself that both management and the union of the automobile companies see the need for a changed technology to allow us to compete more successfully.

I am wondering whether this is preeminently the time for the Federal Government to cut back in vocational education.

Dr. Carnevale?

Dr. CARNEVALE. Well, there are some severe difficulties with the Federal deficit at the moment that require that certain cuts be made or revenue restorations to balance cuts and so on.

Incidentally, as an aside, I think that while that in economic terms is something that needs to be done at the moment, I am not

one of those who feels that deficits are indeed serious difficulties when they are kept at two percent of GNP or so.

I think we, in general, have overreacted to deficits but not in this case. That is one of the difficulties with the current problem is that it is, in fact, real. But, it derives mostly from a tax cut and not from difficulties we have on the spending side.

Having said that, no, I do not think it makes much sense to cut vocational education by 30 percent or so, but only if vocational education serves an urgent national purpose.

I think that to the extent that vocational education does indeed contribute to our possibilities for economic growth and possibilities for the revitalization of the American economy that it does serve that purpose.

As many people in this room know, historically, that is really a new mission for vocational education. It has not been much a part of economic policy or economic development policy at the Federal level.

It has served a number of different purposes over the years. It has been, in my judgment, somewhat unfairly whip-sawed over the years.

During the Great Society years, it was forced into services of the disadvantaged populations. There are numerous set-asides in the legislation that have very little to do with economic development.

But to the extent that the program does, in fact, serve the main-stream purposes of economic growth, I think it is silly to cut it and, in fact, if vocational education does not serve those purposes and it is cut, then I think we would best invent another program that does in a hurry.

We do need a national commitment to human resource development in the interest of the overall performance of the economy, and I think there is no doubt about that whatsoever.

Mr. KILDEE. Thank you. Does anyone else wish to comment on that?

Mr. LYNCH. The tremendous commitment to armament would seem to call for an increase in training. Who will repair, who will maintain, who will install the equipment that is to be acquired?

From Michigan's point of view, speaking for the community colleges, I recognize the problem that exists at the national level. The problem in Michigan is at least as acute.

Michigan as a State has reduced its support of the community colleges from 2 years ago, when it supported us at a level of 48 percent of our total budget, to this year, where it is at 39 percent.

If we are to remain competitive, if we are to remain viable without our community, if we are to remain a supplier of trained individuals to add to the economic development and economic growth, then the Federal Government cannot withdraw its support. It must increase its support.

Mr. KILDEE. Mr. Baker?

Mr. BAKER. The Illinois State Chamber of Commerce, as most of the chambers of commerce in the United States, certainly supports the economic recovery program and the President's attempts to reduce the overall Federal budget.

We also, at a recent conference here in Washington just earlier this week, voted overwhelming to support the concept of New Federalism.

So overall, I would say that we support this continuing movement toward reexamination of the Federal, State, and local roles.

I think, however, that in the case—and certainly from when I talked to my colleagues and watched the way they use it—that I think in one case of partnership we are seen in a merging workable and effective partnership among the three levels of government.

Vocational education is predominantly a local activity, perhaps much more even than some other Federal programs, but particularly during this critical period of transition that we are now in, and I think people are slow to recognize as we move from an industrial society based on electrical, mechanical systems to ones based on electronics systems, there is indeed a Federal role for aiding local education agencies and training facilities and industry in an understanding what the implications of that role are.

A person that I talked to at G.T. & E., which is always a high-tech company, said you know, when I look at the vocational education community, what I see there is an asset in place and ready and willing to accept this joint responsibility for retooling our people, and I certainly support it 100 percent, to the point that he is active on the technical advisory committee of the community college, and as I mentioned before, has even negotiated the G.T. & E.'s direct contribution to the community college to build a facility within the community college to support the retooling of their organization.

I think it is a classic case, of course. And when we are looking, we certainly support the principles outlined in the President's program and it is sometimes going to have a negative impact if it is taken to its fullest extent on our own industries.

Mr. KILDEE. Dr. Carnevale, you are an economist, so let me direct this question to you.

In our economy, the automotive industry is subject to alternating cycles of prosperity and relative decline.

Given this situation, is not the Federal Government, which is in a position to exercise some control over both monetary and fiscal policy, best able to react to the economic needs of the country, including this reindustrialization.

Dr. CARNEVALE. There is a definite difficulty as a result of this cycle in overall resources devoted to training both public and private.

This recession, and there is some anecdotal evidence and some broad statistical evidence, and I am sure there will be more, that there will be cutbacks in both private industry in training and there is certainly cutbacks in public training all over the place; even if we don't cut programs absolutely, we are cutting them relative to the rate of inflation, and so on.

The Federal Government has filled in prior instances—it has, at least, attempted to—that deficit when it occurred; when the economy was in a downturn, the Federal Government tended through tax provisions to allow private firms and individuals more funds to devote to these purposes.

We are in a peculiar situation at the moment where we are in a downturn; our monetary policy fights inflation very aggressively and thereby does not allow the Federal Government to spend money, either through the Tax Code or through appropriations, for this purpose.

And so, it is really a double-edged sword at the moment. We are in a downturn and I think we are promising ourselves further downturns later because the Fed is not intervening and filling what is, I think, a more significant deficit in education and training nationally.

And yes, the Federal Government is the only government, because of its stabilization role and because it prints money, that can, in fact, do that.

And we have essentially surrendered that purpose in this recession in order to fight inflation.

Mr. KILDEE. Thank you. Does anyone else have any comments on that? Mr. Hobson?

Mr. HOBSON. We in the State government in Ohio very much agree with the overall direction that this current administration is heading.

However, one of the things that has happened as a result of reduced cuts is that it has forced an issue at the local level of bringing people together that heretofore have not been together to meet specific kinds of needs and job training is a very good example.

Several years ago, the State development agencies were not involved in job training issues per se at all. But because of the mixing of funds to meet a goal, because of reduced budgets from the Federal level, we have established that as a priority.

However, it is not enough, and the Federal Government also needs to consider that issue even with the old CETA programs. Sometimes the Federal job-related kinds of programs were going different directions, and I think that is beginning to come around a little bit now that I can see.

At least at the State level, we are getting them all in the same direction to maximize resources and the very limited resources that we have.

Mr. KILDEE. Mr. Miller has left a question here I would like to ask. He addresses this to Dr. Carnevale.

What percentage of private industry training is in response to technological change?

Dr. CARNEVALE. Well, the short and simple answer to that is that we really do not know.

Most of private industry training is in response to change; that is, it is a matter of trying to fit human skills with changing product requirements. If you produce new products, you have to refit assembly lines and refit plants. If you introduce new technology, you have to acquaint human beings with it and integrate them to it.

You have to adapt, is basically the demand in the private sector and that is why they spend as much money as they do, and that is why their training is very job-specific. It is oriented toward the production of specific items.

There is a fair amount of entry-level training, but in a sense, that is also adapted in that it is targeted very tightly on their re-

quirements of production in specific firms to produce specific products.

So, I would guess of the \$40 billion, the lion's share of it is used for this purpose, broadly understood. And one of the major skilled deficiencies and retraining needs that we do not focus on too much, and I am sure these gentlemen deal with very directly all the time, is that a lot of this skilled deficiencies or shortages do not necessarily result from the kinds of shortages we see here in Washington at the national level, that is a shortage of machinists, a shortage of engineers.

The shortage that private employers tend to face is of a more subtle kind, and that is the retraining of people in existing professions and occupations at the margin, to bring them up to speed with new technology and requirements of new products.

The differences in engineers now and 5 years ago, that is, the requirements for an engineer in a firm for production in chip technology, is very different than the kind of engineering skills that were required a few years ago.

Incidentally, this is also true with management skills. There is a rapid change in many firms with respect to the way that managers are being encouraged to relate to employees with the increased participation of the employees in production and so on.

So, all of that tends to be adaptive, and I think that really is the cutting edge of training and it is a very subtle business. It is not the sort of thing that you notice nationally. It tends to occur region by region, sometimes in specific States and specific areas, but even more so, in specific firms as they try to compete.

And since that competition is more and more international and since product life, given the spread of technology, especially in high-technology industry, is very short now, skill life of individual employees is also very short. And so, retraining seems to be the cutting edge of private training, and that is pretty much all adaptive in nature and in response to changing technologies and changes in work place requirements.

Mr. KILDEE. Are there any additional questions? I want to thank the panel. You have presented excellent testimony which will be very helpful to this committee.

I think you find on both sides of this rostrum and this committee a real dedication to education and vocational education. It is a non-partisan issue.

You have been extremely helpful, as we are in a process of reauthorizing the Vocational Education Act, trying to see what we can do to improve the future of vocational education and the reindustrialization of this country.

Thank you again for your testimony.

[Whereupon, at 11:20 a.m., the subcommittee was adjourned.]

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